

# Contractors and Engineers Monthly

Vol. 45, No. 4

APRIL, 1948

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## Covering the Field

### • Labor Relations

An article on this page tells specifically how the Taft-Hartley Act affects the construction industry.

### • Breakwater Construction

A Great Lakes harbor is being enlarged 10 per cent by the dredging and breakwater job featured on page 2 of this issue.

### • Paving Maine Turnpike

Four hot-mix plants turned out the three courses of asphaltic concrete laid in one season on the 47-mile Turnpike (page 5).

### • New Airport Water Supply

New facilities at Wright-Patterson Fields—see page 14—include a reservoir, chlorinator buildings, and 5 miles of pipe.

### • Highway Grading

Wise choice of equipment helped solve problems of muck removal and replacement on a section of New York Thruway (page 17).

The realignment reported on page 109 will help to prevent highway accidents.

### • Road Maintenance

Everything that can happen to a bituminous road happens often in this big western district. Page 22 covers the battle.

### • Planning Urban Routes

Virginia's 20-year plan includes arterial highways to whip city traffic snarls. Projects and procedures reported on page 33.

### • Building 100 Houses

Giant equipment pours 100 concrete houses, then carries them to the housing area. Story on page 37, pictures on pages 62-63.

### • Road-Construction Costs

A report on the causes of rising costs, and the steps contractors and officials can take to stabilize them, is on page 49.

### • Bridge Construction

A unique temporary bridge carried traffic while an old span was demolished and a new one built. The story is on page 54.

### • Concrete Paving

The 10-mile by-pass described in an article on page 64 was paved without joints, except for a center-line strip.

### • Irrigation Canal

The contract for canal earth work and concrete lining described on page 70 will finish the All-American Canal proper.

### • Cut Accident Losses

An article and diagrams on page 79 tell how analyzing job operations at the layout stage can cut accident losses 60 per cent.

### • Cellular-Type Flood Wall

A new 1½-mile section of concrete flood wall supported on steel piles strengthens Cairo, Ill., against floods. See page 85.

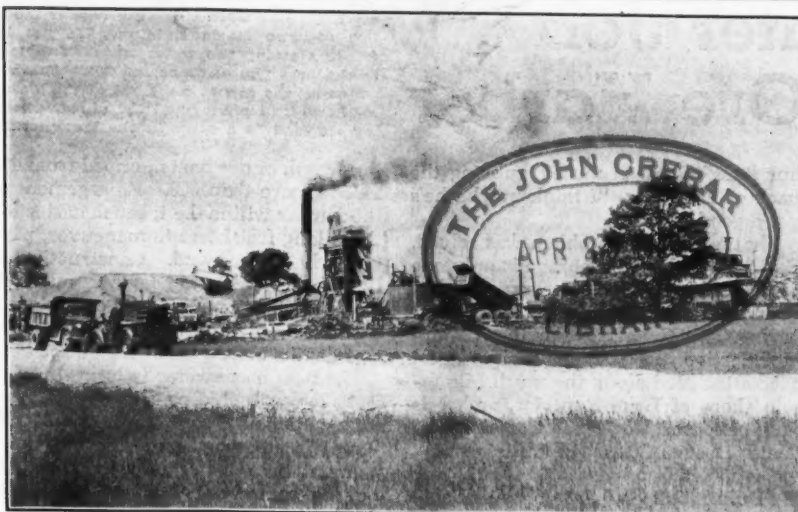
### • County Lays Road-Mix

At a speed of a mile a day and a cost of \$750 a mile, a midwestern county road gets road-mixed bituminous top (page 99).

### • Roadside Development

A full account of Ohio's Seventh Annual Course on Roadside Development starts on page 103.

You will find "In This Issue" on page 4)



Maine Turnpike Authority Photo

Four hot-mix plants dotted the Maine Turnpike last season as the 47.4-mile dual highway was paved with three courses of asphaltic concrete. This is one of the set-ups—a Madsen asphalt plant and a Cedarapids crushing plant, set up near Boom Road on the Gibbons & Reed Co. subcontract from B. Perini & Sons for the north half of the job. The construction story is on page 5.



C. & E. M. Photo

A new section of concrete flood wall will help Cairo, Ill., keep its feet dry. As described on page 85, Ottinger Bros. used a Koeberling 27-E paver to fill a Wiley bucket with concrete, and this Lorain crane to lift the bucket to the wall forms.



C. & E. M. Photo

This isn't a cannon. It's a Tournamixer, powered by a Model C Tournapull, which William Radkovich Co. used to build 100 concrete houses at Muroc Air Force Base in California. The story on page 37 and the pix on pages 62-63 tell how the houses were poured in sections, then picked up and carried to their sites by a Tournalayer.

## Taft-Hartley Act And Contracting

### Analysis of New Labor Regulations and Problems; Collective-Bargaining Election Plan Outlined

† HOW the Taft-Hartley Act applies to the construction industry was outlined by Robert N. Denham, General Counsel of the National Labor Relations Board, at the 29th Annual Convention of the Associated General Contractors in Dallas, Texas. Unlike other substantial employers in the U. S., contractors were exempted from many problems which arose out of the application of the old Wagner Act. Now, however, the picture has changed.

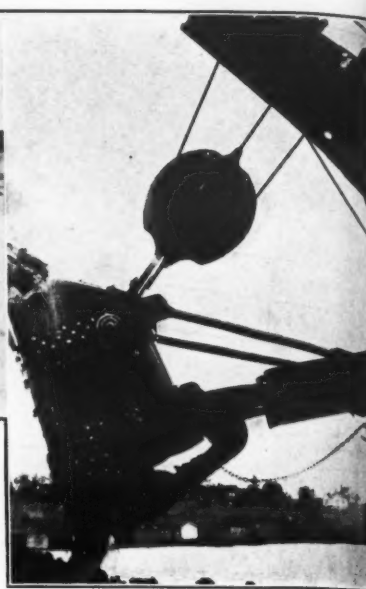
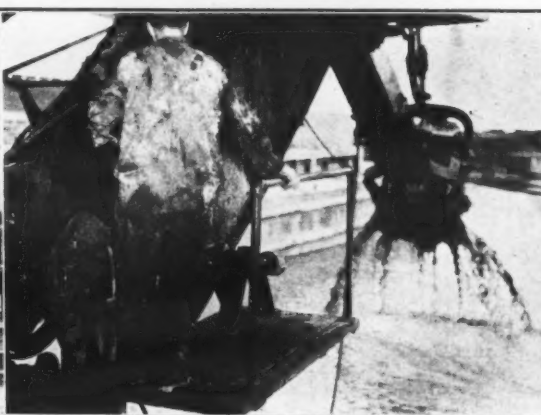
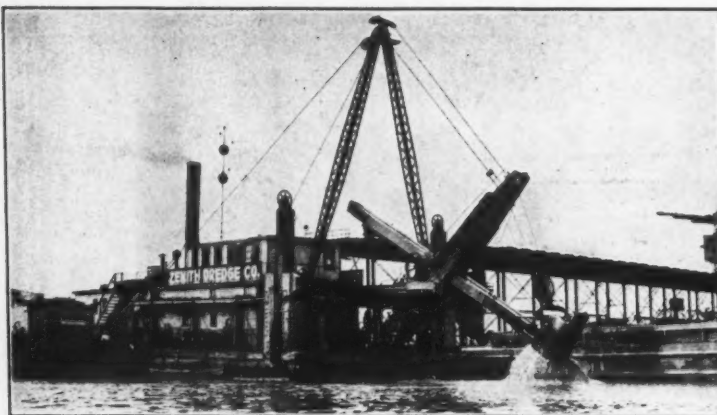
#### Jurisdiction of NLRB

There is a vast difference, Mr. Denham pointed out, between being engaged in interstate commerce in the broad sense of the word, and being engaged in a business which affects commerce. Under the Wages and Hours Law, the former applies. Under the National Labor Relations Act, it is the latter. The activity may be purely local, so far as the actual performance of labor is concerned. It may be—and usually is—directed to the construction of something which is immovable, and can not be shipped about in interstate commerce. But to say that the building and construction industry does not affect commerce, which is the NLRB criterion, is baldly to disregard the facts.

"The steel you use in your structures pretty generally comes from outside the state," said Mr. Denham. "The lumber may be shipped from the southern lumber regions, or from the west, or from the north; rarely does more than a small portion of it come from within the state where it is used. . . . The same is true of your equipment." Therefore, to say that an interruption in the use and consumption of these articles would not affect commerce would simply be to ignore the facts.

There have been some cases in some of the courts, he said, (not, however, pertaining to the National Labor Relations Act) in which an attempt has been made to draw a distinction between various kinds of construction: on the one hand, homes and apartment houses, all intended to house residents of the locality; and, on the other, loft buildings, factories, roads and bridges, and things of that sort. This distinction has been made in order to determine whether the ultimate product is or is not an instrumentality of commerce. But the NLRB is not hampered by that degree of narrowness, Mr. Denham explained. Its jurisdiction is not measured by whether or not an employer is engaged in interstate commerce. Its limitations are those that are inherent in the sole question, "Does the business

(Continued on page 120)



C. &amp; E. M. Photos

The Zenith Dredge Co. puts its No. 27 dipper dredge to work enlarging harbor facilities at Two Harbors, Minn. We see its dipper clearing the water with a full load in the first photo; crane man Herb Johnson watching the dipper come out of the water, in the second photo; and the dipper dumping its load to a scow in the last picture.

## Big Breakwater Job Enlarges Ore Harbor

### Dipper Dredge Commences Job as Quarry Produces Stone; Preliminary Work On Contract Is Extensive

† BEYOND the Government breakwater at Two Harbors, Minn., the first hard autumn storm churned Lake Superior to blue fury. As the first swells rolled inshore, the big derrick boat on the new breakwater site creaked and groaned.

John "Cap" Carlson, visiting the job in his role of dredging and waterfront expert, turned to Don MacDonald, President of Zenith Dredge Co. His keen eyes had seen the apparent drifting of ranges.

"By golly, Don, I think the anchors don't hold", he said.

"They should", MacDonald replied. "They weigh 6 tons apiece."

"Yust the same the anchor she comes in when they take a strain on the port breast line", insisted the old veteran of lake work.

MacDonald asked, "What do we do?"

"Ernie Gustafson with the Army Engineers tell me we should put big rocks—maybe 20 tons—on the end of

our lines", Carlson mused, rubbing the back of his head. "I think maybe he's got a good idea."

That is how one problem was solved. But derrick-boat anchorage is only one of the problems which Carlson and alert young company President MacDonald face at Two Harbors. For the harbor-modification project is one of the biggest ever attempted along the north Minnesota shore of Lake Superior, and it is fully exposed to lake storms. The Zenith Dredge Co. of Duluth is pushing the job, which will cost \$3,000,000, for the Duluth Office of the Corps of Engineers.

The project consists of removing the old east breakwater, of building a new one farther out in depths up to 80 feet, and of digging 122,000 cubic yards of hard clay, hardpan, boulders, and solid rock. Perhaps 17,000 cubic yards will have to be drilled and jarred loose by high-velocity explosives ahead of the dipper dredge. Construction of the big breakwater will involve the quarrying and placing of 400,000 tons of stone.

#### Bigger Harbor Needed

The existing harbor facilities at Two Harbors have been obsolete ever since

the length of ore boats jumped from 400 feet to more than 600. Enlargement of the harbor will make it much easier for these long freighters to maneuver, particularly in the wind. Construction of the new breakwater farther out will make the port about 30 per cent bigger, and dredging will establish 26 and 28-foot depths to new limits inside the bay.

The new breakwater is to be 1,628.48 feet long, including 326.25 feet of rubble-mound shore connection. Its design is patterned after the old Government breakwater now in place. It will be composed of a rubble mound faced with cover stone built up to an elevation of 18 feet below low-water datum. Stone-filled timber cribs, each 100 feet long, centered on top of the rubble mound and penetrating the cover stone a minimum of 4 feet, will then extend 6 feet above the normal water line.

One of the contract provisions on which much of the initial performance hinged is a clause which stipulates that the rubble mound must settle for six months before timber cribs are placed and filled with stone. Thus all possible effort was spent in 1947 to get some of the rubble mound finished, so the first

of 13 cribs could be placed at the start of the 1948 season.

The work is being done under a continuing-appropriation form of contract. The project has been approved, its construction ordered by Congress, and approximately \$1,250,000 set aside for the first work on it. It is expected that further appropriations will let the job continue without interruption.

#### Initial Work Is Varied

Initial work on this contract has actually been under way for some time. Four years ago Zenith Dredge Co. purchased a 4-yard steam dipper dredge at Manitowoc, Wis., rebuilt the A-frame and fore and aft stay assemblies, did some mechanical work on her boiler, and braced her hull. The best parts from Zenith's old No. 2 dipper dredge were also installed. While many of the engines and hoists on the rejuvenated No. 27, as the dredge is called, are so old they no longer have nameplates, the craft is powerful and capable of good work.

Also, during the war, Zenith built 30 steel ships for the U. S. Coast Guard and U. S. Navy. At the conclusion of

(Continued on page 113)

Photo 1: an Industrial Brownhoist railroad crane loads a 25-ton rock for the Two Harbors breakwater onto a railroad flatcar. Photos 2 and 3 show details of the chain and cable basket which holds the rock, as men steady it into place. In photo 4 the derrick boat at the dock takes on a cargo of stones in steel skips. Photo 5 shows workers hooking a chain bridle to one of these skips. Note the timber and gravel protection on the flatcars

C. &amp; E. M. Photos



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Pa.

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**ELIZABETH**  
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## Is the Contract System in Jeopardy?

Statements made by Government officials before the 29th Associated General Contractors convention at Dallas, in February, would seem to indicate that the very existence of the contract system is threatened. One of these statements was that contractors are creating an argument against contracting by trying, through escalator clauses, to eliminate all risks. Another was that the practice of joint-venture bids is operating "to preclude a wide, and desirable, competition".

If these statements are valid, then indeed does the contract system appear to be on shaky ground. But we wonder if all the factors have been taken into account. A number which apparently have not—though a few of them were brought out later in the meetings—indicate that the contract system is on a much firmer foundation than these statements would suggest.

What about the size of present-day jobs as a factor in the practice of joint-venture bids? In the short span of 15 years, the size of projects has jumped enormously. Where a \$350,000 job was considered large in 1930, jobs totaling \$20,000,000 or \$30,000,000 or \$40,000,000 are fairly commonplace today—though they are no mean ventures for the men who gamble their own money to the limit of their bonding capacity for doing the work.

Even if a job such as a \$20,000,000 dam matches a contractor's bidding capacity, he still may be unable to bid the job singly. For bidding capacity means not only that job, but also whatever work he has under way. And if he's big enough to handle a \$20,000,000 dam, he must certainly have plenty of other work under way. Without it he couldn't hold his organization together and stay big.

Contractors can't afford to remain idle for a year waiting for a job to be let. They're in the gambling business and they can't stack all their chips on one big job. It isn't practical economics. Such a company might well be in a position to take say 20 per cent of the \$20,000,000 dam job but wholly unable to bid the job individually.

While to some extent it is true that joint bids spread the risk of loss, that is not the average reputable contractor's only line of thought. He is in business to make money. To do this, he must have jobs. On joint-venture bids he can pool his organization with another contractor's and come up with high-caliber management executives especially suited to all phases of a multi-million-dollar job. The same applies to equipment. When expert men and good equipment can be pooled among organizations, the result is a better job—and a lower bid. For invariably, when joint-venture bids are placed on a job, the profit figure selected for the bid is the lowest one suggested by any of the participating contractors.

Far from precluding wide and desirable competition, then, joint bids on a big project may mean more bids than could possibly be made if contractors were forced to bid singly.

As for contractors attempting to eliminate risks and uncertainties through escalator clauses—last year and this year the AGC has gone on record against escalator clauses on jobs of shorter duration than 2½ years. And as for the risks and uncertainties themselves, contractors still face plenty of them—many at the doors of the very agencies that award the contracts.

There is the uncertainty of Government-furnished materials, of shut-downs, of the indefinite character of USBR funds, of slow action on claims, of awards and change orders. The uncertainties of specifications and the attitudes of field men—not necessarily collusion between contractors—play a big part in excessive costs.

The most serious headache of all is still the meaning of specifications. Though the trend is towards more precise specifications, some continue to set forth the conditions in vague language, and then to nullify the whole paragraph by adding "or as directed by the contracting officer". Contractors

simply have no way of knowing what they may be asked to do, and they can safeguard themselves only by adding a certain percentage to cover contingencies.

We know that progress is being made to eliminate some of these snags. The sincerity which typified the cooperation between the AGC and Government officials at the recent meeting is proof of that fact, and we congratulate all concerned for whatever progress was made.

But a wider recognition of contractors' problems on the part of Government agencies would help. Especially if carried down to district and field levels, such a realization would do much to stimulate cooperation that is needed badly on many a job today.

It is only on jobs where the Government and the contractor work together that we can secure the public works needed for national welfare, with the best possible use of the tax-payers' money, and insurance that the free-enterprise system will continue in construction.

## Dollar Volume of Work On Roads Misleading

Although the estimated \$1,154,000,000 of highway construction throughout the United States during 1947 seems high, the Public Roads Administration points out that this volume should be viewed in proper perspective. Any appraisal of the current status of highway work should take price changes into account.

Actually, the physical volume of highway construction in 1947 was 29 per cent less than in 1939, and less than half that of the peak years 1930 and 1931. In fact, the 1947 physical volume of highway construction was 31 per cent less than the yearly average during the pre-war period from 1925 through 1941. Although the physical volume of work in 1947 was 43 per cent more than in 1946, it should be noted, PRA reminds us, that in 1946 the physical volume of road work was the smallest in any peacetime year since 1920.

In contrast, other types of construction—private residential, industrial, and commercial building—have experienced a more vigorous post-war expansion. Whereas highway construction in 1947,

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expressed in terms of physical volume, was 29 per cent under 1939, industrial building last year was three times the 1939 physical accomplishment; commercial building was up about 60 per cent; and private residential building up approximately 20 per cent.

## Construction Survey On Outlook for 1948

The 1948 construction outlook is for a high volume of activity, according to a nation-wide survey conducted by The Associated General Contractors of America, Inc. The survey shows that the gradual upward cost trend is expected to continue until prices throughout the nation's economy show a tendency to stabilize. It suggests that increased efficiency in operations will come about as shortages of materials, equipment, and skilled workmen are overcome.

In connection with volume, 63.4 per cent of those responding reported that more work is coming on the market. New construction during 1947 exceeded \$12,000,000,000. The survey indicated that estimates of more than \$15,000,000,000 for 1948 will be met. Demand is continuing high or increasing for commercial, institutional, industrial, public utility, highway, and housing construction. A factor leading to the increased volume is realization that costs cannot decline quickly.

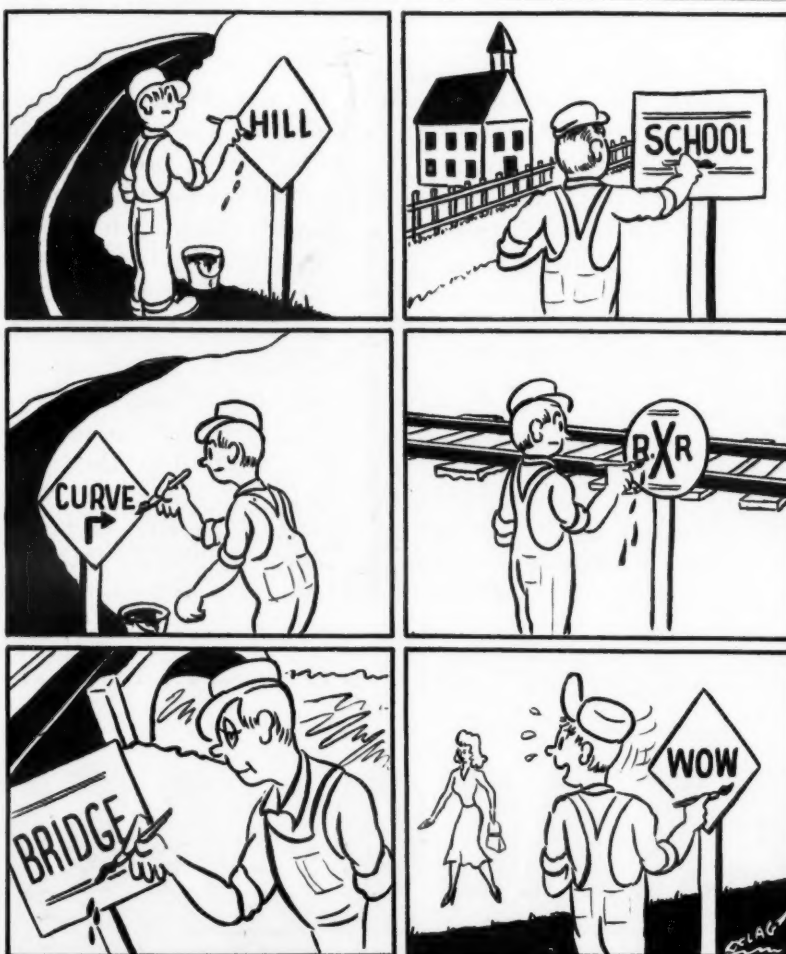
A total of 78 per cent reported cost trends were continuing a slightly upward trend. Twelve per cent reported signs of stabilization, 5 per cent reported costs stabilizing, and 4 per cent reported a slight downward trend. Continued increases were reported due to increasing prices of materials, recent or impending wage increases, increased freight rates, and general inflationary tendencies.

The various indices of construction costs show steady, gradual increases for the post-war years 1946 and 1947 of from 31 to 37 per cent above the 1945 average. During the same year, the index compiled by the Bureau of Labor Statistics of wholesale prices of all commodities showed an increase of 54 per cent.

Gradual improvement was shown in the supply of materials, with 55.6 per cent reporting an adequate supply, or an adequate supply except for certain items. Principal shortages reported were steel products, steel and cast-iron pipe, cement, and lumber and millwork.

In regard to equipment, 60.6 per cent reported an adequate supply of equipment or an adequate supply except for certain items. Principal among the scarce items were shovels, cranes and draglines, and tractors. As for labor, 49.5 per cent reported an adequate or improving supply of skilled workmen.

Have you bought a U. S. Security Bond this month?



# Four Hot-Mix Plants For Maine Turnpike

**Dual 47.4-Mile Highway Is  
Finished in Record Time;  
Over 500,000 Tons of  
Asphaltic Concrete Used**

By WILLIAM H. QUIRK,  
Eastern Editor

(Photo on page 1)

IF records of paving production on big highway jobs were kept and compared, the Maine Turnpike last year would certainly have established some kind of mark for others to shoot at. The picturesque limited-access dual highway, stretching from Kittery, Maine, at the New Hampshire border, northeast 47.4 miles to Portland, was paved in a single construction season with three courses of asphaltic concrete totaling 7 to 8 inches thick. Four asphalt plants, spotted along this newest of the nation's "super" roads, produced a total of 518,185 tons of plant-mix between May and November. The two new roadways, separated by a central mall, have 24-foot pavements.

The Maine Turnpike Authority, sponsor of the self-liquidating toll-road project, divided the long paving job into two contracts of about equal size. B. Perini & Sons, Inc., of Framingham, Mass., was low on both contracts with bids totaling \$4,604,674. The prime contractor then sublet the paving for the north half of the job to Gibbons & Reed Co. of Salt Lake City, Utah. That firm from the far west happened to have its asphalt equipment idle at the time. And so it was favorably inclined to take a share of this big production job, even if it meant moving machinery nearly the width of the continent.

With two such big contracting firms on the job, one from the east and the other from the west, all concerned with the project were satisfied. The Maine Turnpike Authority looked forward to getting the Turnpike finished as soon as possible in order to start liquidating its cost with revenues from the tolls to be charged. The consulting engineering firm of Howard, Needles, Tammen & Bergendoff, of Kansas City, Mo., and New York City, designer and supervisor of the construction, looked favorably on the new equipment that the Perini company purchased in order to turn out top-grade work. The contractors, in turn, liked the long straight-away job that offered a challenge to big asphalt-production figures.

The job was finished a little later than had originally been hoped for, but not through any fault of the paving contractors. Delays in obtaining steel for some of the bridge superstructures created a bottleneck. Nonetheless the spans were completed for the Turnpike to be opened to the public during December, 1947.

## Three-Course Plant-Mix

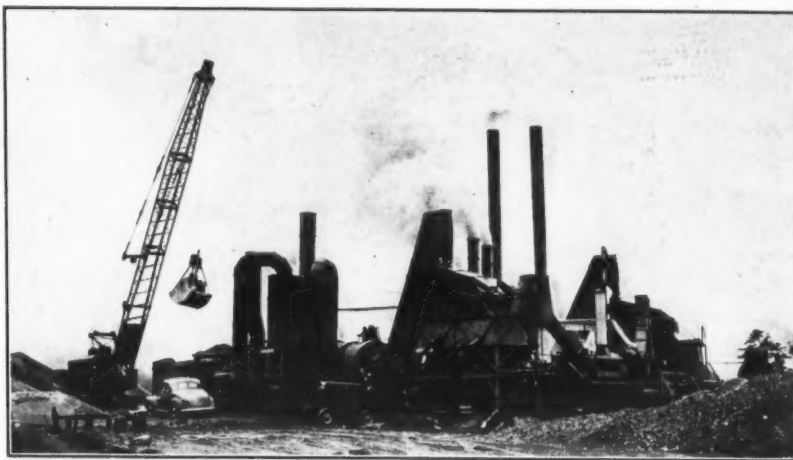
Most of the grading for the new Turnpike, which got under way in May, 1946, was finished by last summer. (See C. & E. M., Jan. 1947, pg. 2). On top of the subgrade is a foundation course of permeable material which extends out under the shoulders to meet the slope line. The thickness varies from 12 inches in rock cuts to 42 inches in the earth cuts and fills. This granular blanket provides good drainage, and also eliminates harmful frost action.

On this foundation an asphaltic-concrete base course was laid, either 5 or 6 inches thick depending on the soil conditions beneath. The base was put down in two courses, each 2½ or 3 inches thick. It was then covered with a surface course 2 inches thick. Gravel pits

supplied the aggregate for the base course, but crushed stone was used in the top course to provide a tougher and longer-lasting wearing surface. The asphalt used in both mixes had a penetration of 85-100.

The composition of the plant-mix according to the gradation requirements was as follows:

		Per Cent by Weight	
Passing Sieve	Retained on Sieve	Base Course	Surface Course
2-inch	1-inch	15-45	....
1-inch	¾-inch	3-45	....
¾-inch	¾-inch	....	18-50
¾-inch	No. 4	3-36	....
No. 4	No. 10	5-15	9-22
No. 10	No. 40	3-19	5-22
No. 40	No. 80	5-22	9-27
No. 80	No. 200	3-15	5-18
No. 200	....	0-5	5-8
Total mineral aggregate		93.5-95.5	92.0-94.0
Asphalt cement, 85-100 penetration		4.5-6.5	6.0-8.0



C. & E. M. Photo

Here are the dual Barber-Greene continuous hot-mix plants which B. Perini & Sons set up to turn out base course for its Maine Turnpike paving contract. The crane is feeding aggregate to the hoppers.

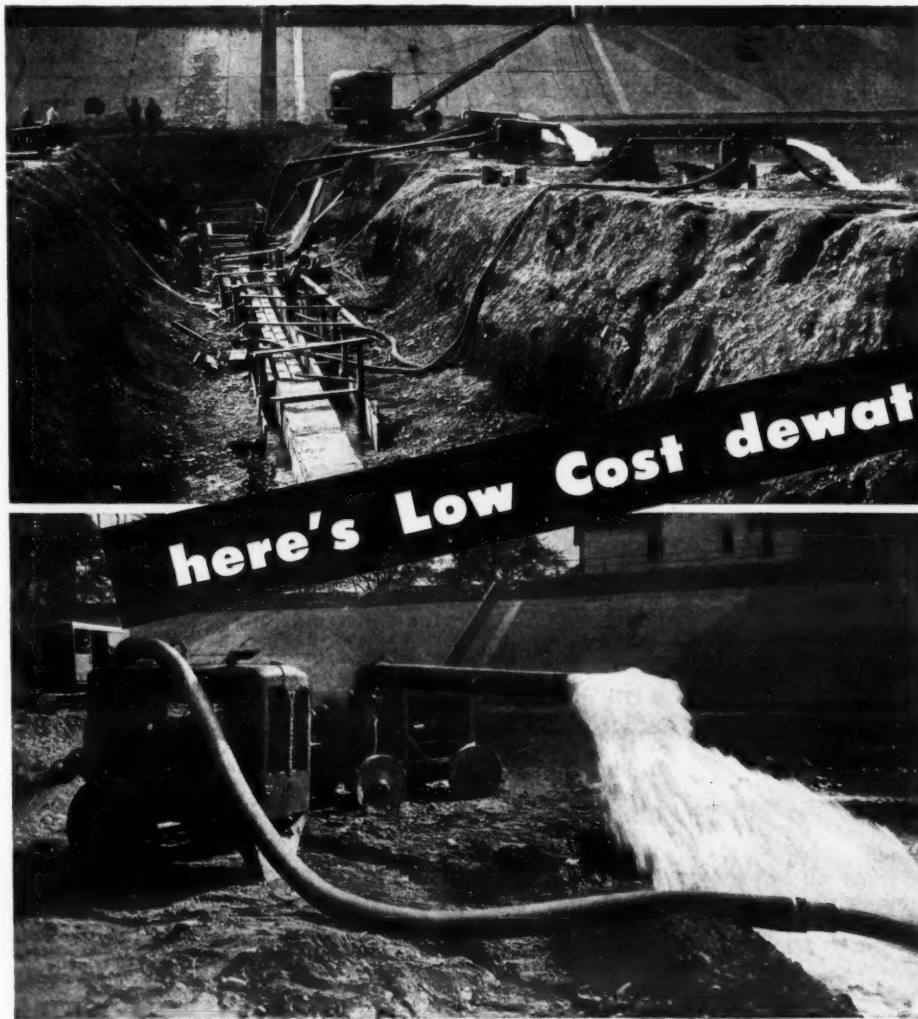
## Source of Materials

All the gravel aggregate mixed in the base course was taken from pits along

the Turnpike. But these pits were far enough back from the roadway so that

(Continued on next page)

- This contractor was able to lay telephone conduit in a river bed behind a row of easily portable Jaeger pumps and simple drainage lines . . .
- This low-cost system was practical because his Jaeger pumps primed quickly and unfailingly as soon as water sealed the intake and had the big capacity needed to keep the trench pumped out.



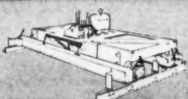
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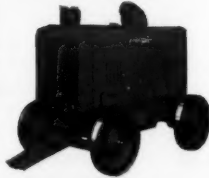
1½" Bantam, world's champion lightweight



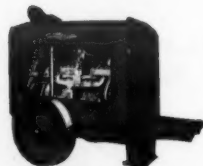
2" and 3" portables



Compact 4" and 6" pumps



8" and 10" portables, up to 240,000 gph



Self-priming jetting pumps



*Maine Turnpike Authority Photos*  
B. Perini & Sons set up two Cedarapids crushing plants to process aggregate for its half of the Maine Turnpike paving. One of these is shown above. The company also set up two asphalt plants. The one at the right, a Cedarapids, turned out hot-mix for the top course.

## Four Hot-Mix Plants For Maine Turnpike

(Continued from preceding page)

they were well screened with trees and did not leave an unsightly scar on the landscape when the construction was finished. On the south half of the project Perini obtained stone for the surface course from a quarry which he opened up not far off the right-of-way. The quarry could not provide enough stone for all of the upper half of the project too, so Gibbons & Reed Co. purchased crushed stone for its share of the surface course from the Blue Rock Quarry at Westbrook, Maine, about 4 miles from the north end of the Turnpike. The stone was delivered to the job by truck.

All the bitumen for the entire job came from the Colonial Beacon Oil Co. of Everett, Mass., and was hauled from there to the four different asphalt plants on the job by the Trimount Bituminous Products Co. also of Everett, Mass. The haul from Everett to the south end of the job is 60 miles. The bitumen was transported in 14 trailer tank trucks holding 3,000 gallons each, and when the job was in full swing these trucks hauled asphalt both day and night. At the plants the material was pumped from the trucks into the storage tanks.

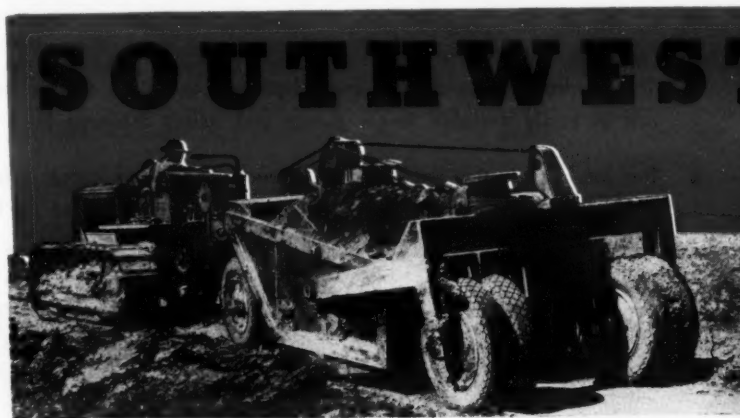
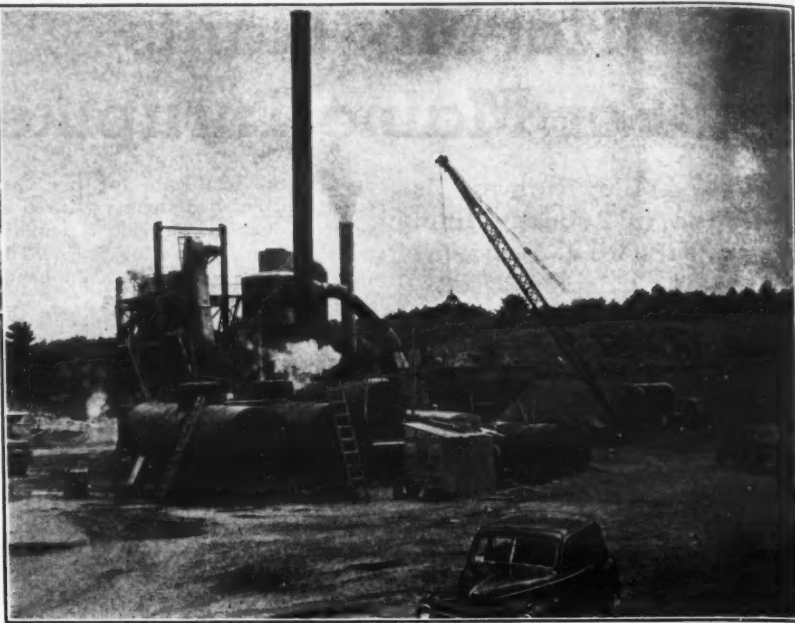
### The Plants

All the aggregate for the base course and the sand for the top course on the south half of the project was processed out of a Cedarapids crusher which Perini set up near Wells, just west of the Turnpike and about 17 miles from the south end. A Northwest 1½-yard shovel loaded the excellent bank material into two end-dump Euclids. They hauled it a few hundred feet from the bank to a receiving hopper which took small boulders up to 10 inches in size. A 10 x 36-inch jaw crusher reduced the larger particles to a maximum 4-inch size. A conveyor carried the material along to a 40 x 24-inch roll crusher where the aggregate was reduced further in size to a maximum 1½ inches. A 7/16-inch screen scalped off the excess fine material for sand. This plant had a capacity of 200 tons per hour.

From the loading bins at the crusher the assorted aggregate was hauled in two other end-dump Euclids a short distance to the asphalt plant, where all of the base course for the south half of

the job was mixed. The material was dumped into stockpiles which were kept in shape by an International TD-14 tractor with a Bucyrus-Erie dozer blade. From the stockpiles a Northwest crane with a 70-foot boom and a Johnson 2-yard clamshell bucket loaded the material into the plant hoppers.

(Continued on next page)



**THESE SOUTHWEST 4-WHEEL SCRAPERS** are unequalled for economy and efficiency in fast, low-cost dirt moving. Check these outstanding features: ● **FASTER, EASIER LOADING**—The "rear lift" method of control permits the bowl to lay flat when digging. The earth is "rolled into" the bowl instead of being forced "uphill". ● **POSITIVE, ROLLING EJECTION WITH LESS POWER**—assures accurate control of spreading depth from a thin layer to a single heap. ● **CUTS CLOSE TO BACKSLOPES, BUILDINGS AND RETAINING WALLS**—Cutting edge extends almost the entire width of the frame, permitting close, accurate cuts. ● **SHORT TURNING RADIUS AT FAST SPEEDS**—Even load distribution, low center of gravity and balanced weight provide extreme stability. ● **FINISHES SIDE SLOPES EASILY AND SAFELY**—There is no top-heavy superstructure to overbalance this scraper. It rides the slope as smoothly as on the level.

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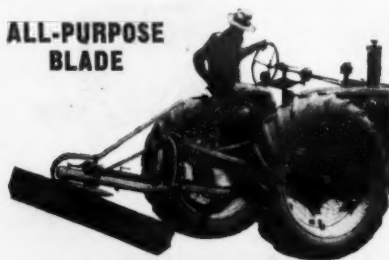
CONSTRUCTION MACHINERY DIVISION

## Southwest Welding & Manufacturing Co.

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**DANUSER** ALL PURPOSE BLADE

The plant actually consisted of two complete Barber-Greene continuous-mix units set up in the form of a capital U. The crane worked in the open space at the top, feeding the aggregate to a 30-yard hopper on each side. The material passed through each separate plant until it finally came out asphaltic concrete and was discharged into one common hopper at the bottom of this letter U. From there trucks hauled the plant-mix to the pavers on the road.

#### Dual Continuous Mixer

From the receiving hoppers at the plant the aggregate dropped down to a feeder which moved the material along to a 20-foot cold elevator that raised it to a drier. At the outlet end of this 20-foot-long x 8-foot-diameter drier a Hauck burner threw back into the single shell a steady stream of fire which heated the material as it passed through. From the inlet end the fines and dust were sucked out by a Clarage exhaust fan and passed along into a dust collector. A screw gear moved the fine material along to the foot of the hot elevator where it joined the rest of the heated aggregate. Smokestacks carried off the heavy smoke and fumes.

The aggregate then went up a 35-foot hot elevator to a triple-screen arrangement which segregated the material and dropped it into four bins at a lower level. The bins held respectively sand, 7/16, 9/16, and 1 1/8-inch gradations of coarser gravel. As the material was released from the bottom of these bins, a calibrated feeder moved the stipulated amount of any one size along on a belt to a second hot elevator 20 feet high. At the top of the elevator the aggregate entered the continuous-mixing pugmill to which the asphalt was admitted.

In a row along one side of the plant were three large asphalt storage tanks. Two contained 16,000 gallons each and the third held 8,000 gallons, for a total storage capacity of 40,000 gallons. Another storage tank held 12,500 gallons of fuel oil, while water was stored in a tank of similar size. Steam for the plants was supplied by two Standard horizontal 125-hp boilers at 130-pound pressure. Each was fired by a single Hauck oil burner. Both the asphalt and fuel oil were pumped from the storage tanks to the pugmills and burners respectively.

Three International diesel engines operated each of the twin plants. A TD-9 engine drove the fan and dust-collector mechanism. A TD-18 ran the cold elevator, drier, first hot elevator, and the screens. Another TD-18 furnished power for the gradation or feeder unit, the second hot elevator, the asphalt pump, and the pugmill.

At the discharge end of each plant the hot-mix was dumped into a common hopper holding 9 tons. The trucks which hauled the mix to the pavers were loaded beneath this hopper as they backed under. With such a large hopper the plants did not have to stop operating if the trucks were delayed for any reason. It also speeded truck loading, for



Maine Turnpike Authority Photo

A pair of Barber-Greene Tamping-Leveling Finishers lay the second lift of base course on the Perini contract, in 11 and 13-foot lanes across the 24-foot pavement.

as one truck was pulling away and another was backing up both plants were busy filling the hopper. Each plant had a capacity of 117 1/2 tons per hour, so with the dual set-up the total production of base-course mix was 235 tons per hour.

During the latter part of last October

when forest fires were raging through the Maine woods, the flames came dangerously close to the sprawled-out Barber-Greene asphalt plant and its companion Cedarapids crusher at the gravel pit. The large area had been stripped, however, for clearing, and was a safe haven for storage of the con-

tractor's equipment. The big machines in use on the construction project and the fleet of trucks were moved to the center of the clearing where they were a safe distance from the burning forests. Although the fires came right down to the pavement of paralleling U. S. 1 in places, they skipped the Turnpike altogether, which was left untouched by the flames.

#### Other Plants

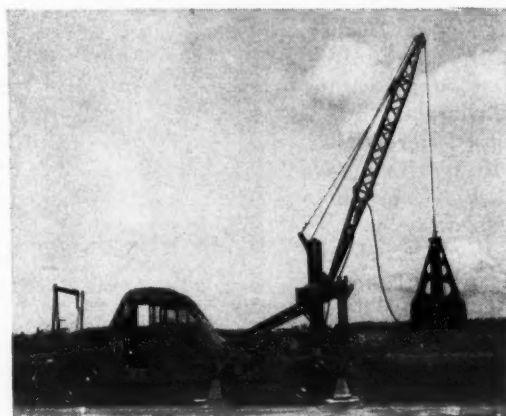
A few miles south of the Barber-Greene layout the contractor set up another plant not far from Ogunquit where the mix for the top course was produced for the south half of the job. Crushed stone for the aggregate was obtained by blasting rock out of a nearby ledge quarry, and processing it through another Cedarapids crusher with a capacity of 100 tons per hour. Sand for the top came mostly from the neighboring gravel plant, with additional fines, added when necessary, from an adjacent bank. The hot-mix

(Continued on next page)

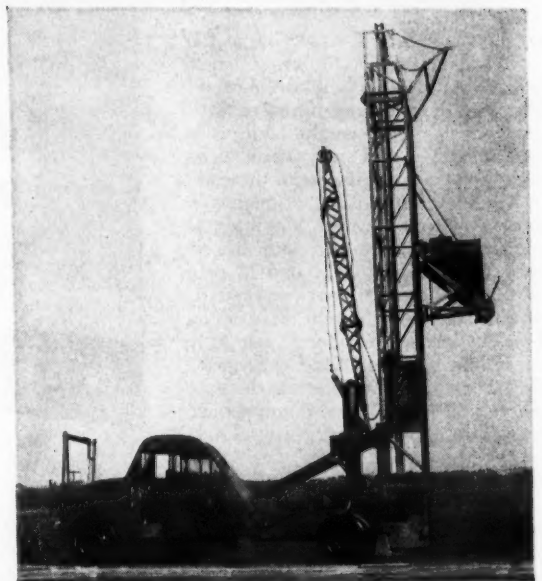
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TOWERMOBILE eliminates erection of costly elevating towers. TOWERMOBILE can be driven to a job and set up ready for operation in 10 minutes by ONE MAN. When hoisting job is completed, tower folds down across cab and unit can be moved to next job.

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## Four Hot-Mix Plants For Maine Turnpike

(Continued from preceding page)

for the top course was turned out in a Cedarapids asphalt plant of the separate-batch type, equipped with a 2-ton pugmill.

Gibbons & Reed Co. on the north half of the project also had two plant set-ups with a crusher and asphalt pugmill-type mixer at each location. One was placed near Biddeford, and the other farther north around Saco in order to equalize the haul distances to the pavers. Both crushers, a Cedarapids and a Pioneer, processed gravel from adjacent banks for the base course. No stone for the surface course was available in this area, and consequently it was purchased from commercial sources.

The asphalt plants were a Madsen 2-ton and a Standard 1½-ton batch type. At the start of the job both plants worked on base course to get down a good stretch along one of the roadways. No hauling was permitted on the base course, however, so the Madsen plant was switched to mix top course alone, while the Standard unit was kept on the base course until it was finished.

### Black-Top Paving

No prime or tack coat preceded the laying of the first course of asphaltic-concrete base. On the Perini half of the job, the lower base course was usually laid one day, the upper lift of base on the day following. On the third day the contractor put on the top to bring the pavement up to finished grade. Four Barber-Greene Tamping-Leveling Finishers were in continual operation, two working on the base and two on the top, in some modification of the 1-2-3-day schedule.

On the lower lift of base course the pair of finishers laid adjoining lanes, with one about 50 feet behind the other. In this way they did not interfere with the movement of the trucks hauling to either machine, and yet were close enough to get a hot joint down the center. To keep any plane of cleavage from developing along the longitudinal center line, the next or upper lift of base course was laid in 11 and 13-foot lanes across the 24-foot pavement. These courses were laid to a loose depth of 3 or 3½ inches in order to compact under rolling to 2½ or 3 inches respectively. The top or surface course was spread to a 2½-inch loose depth which compacted to 2 inches under the rollers.

The mix was hauled from the plants to the finishers by C. E. Hall & Sons, Inc., a trucking contractor from Somerville, Mass. On the way from the plants the trucks and contents were weighed, as payment was made on a ton-mile haul basis. On the long hauls, up to 35 trucks were used, carrying from 9 to 13 tons a load. The longest haul was 17 miles, but the trucks were covered with tarpaulins so that the mix was placed on the road at from 300 to 310 degrees F, the average temperature range.

Perini rolling equipment was all Buffalo-Springfield, including three 16-ton 3-axle tandem rollers, and one two-axle tandem 10-ton roller. Gibbons & Reed Co. equipment included four Barber-Greene Finishers which were worked pretty much according to the pattern followed on the south half of the job. For rollers the latter company also had a couple of the big Buffalo-Springfield 16-ton 3-axle tandem jobs, a Buffalo-Springfield 10-ton 3-wheeler, and a Huber 10-ton 3-wheel roller. It used from 30 to 35 trucks hauling the plant-mix. During the summer months when production reached its peak, the combined forces of the two contracting firms were turning out an average of 125,000 tons of plant-mix a month. They worked a 12-hour day, 6 days a week.



### Shoulders and Center Strip

The outside shoulders are 10 feet wide, while the inside shoulders, next to the 18-foot median strip, are 4 feet. All of the inside shoulder and the 8 feet



At left a shoulder of sod is tamped into place on each side of the Turnpike median strip. The area between is seeded, as you can see in the other photo looking south along the completed Turnpike.

of the outside shoulder adjoining the pavement are of gravel construction

which has been given a bituminous sur-  
(Continued on next page)



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face treatment. The 6-inch course of compacted gravel was built with material graded from 2-inch down, with not more than 50 per cent passing the 1/4-inch screen. Asphalt distributors then applied a prime coat of MC-0 cut-back asphalt to the gravel at a rate of from 0.3 to 0.8 gallon to the square yard. The temperature of the bitumen was kept between 50 and 120 degrees F.

After at least 24 hours, this was followed with a shot of MC-3 cut-back asphalt binder at the rate of from 0.25 to 0.35 gallon to the square yard. The temperature of the material ranged between 175 and 250 degrees F. To furnish a contrast with the black-top pavement, the aggregate for the surface-treatment cover coat was white, or very light-colored limestone chips. The gradation was 3/4-inch down, and the material was applied from spreader boxes at the rate of 25 to 35 pounds per square yard. About 20 minutes after the stone chips were spread, a broom drag was pulled over the surface, which was then rolled with a 5-ton roller.

The 18-foot median strip is raised about a foot higher than the pavements on either side, and is covered with 6 inches of loam. The curb along each side of the strip is banked with sod which was tamped in place, while the area between was first fertilized and then seeded. The fertilizer was spread at the rate of 27 pounds per 100 square yards, while the seed was uniformly sown at the rate of 2 1/2 pounds per 100 square yards. The seed was the previous year's crop and conformed to the following proportions by weight:

	Per Cent
Canadian blue grass	35
New Zealand chewing fescue	30
Redtop	30
Alsike clover	5

#### Toll Schedule

At the south end of the project the Turnpike and U. S. 1 come together to cross the bridge over the Piscataqua River leading into Portsmouth, N. H. At the north end, connections are made with roads leading into the city of Portland. When the Turnpike opened in December the toll for passenger cars was set at 50 cents for the entire 47.4 miles of dual-lane express highway which is devoid of grade crossings. The maximum toll charge for the heaviest trucks is \$1.50. In addition to the toll houses at the Kittery and Portland terminals of the Maine Turnpike, four other toll stations are provided along with entry and egress facilities at Wells, Kennebunk, Biddeford, and Saco. The charge for travel on less than the full length of Turnpike is proportioned at the rate of approximately one cent a mile for passenger cars.

#### Quantities and Personnel

The major quantities in the combined two paving contracts included the following:

Asphaltic-concrete base course	372,996 tons
Asphaltic-concrete surface course	145,189 tons
Reinforced-concrete bridge end slabs	1,600 sq. yds.
Gravel shoulders	113,400 cu. yds.
Cut-back asphalt	545,000 gals.
Cover aggregate	10,200 tons
Loam borrow	160,000 cu. yds.
Seeding	1,307,000 sq. yds.
Sodding	71,000 sq. yds.
Right-of-way fence	366,800 lin. ft.

During the peak of paving operations, from 300 to 400 men were employed on this phase of the construction of the



*C. & E. M. Photos*  
About the last bridge to be finished on the Maine Turnpike was the Mousam River crossing. Actually it is two bridges paralleling each other 50 feet apart on center lines, as you can tell from the first photo. Riveters are at work on it in the second photo.



Turnpike. B. Perini & Sons, Inc., had Louis Capone for Superintendent, while Gibbons & Reed Co. was represented by

A. V. Toolsen, General Superintendent, and B. C. Andrews, Superintendent on the paving. The seeding and sodding

was sublet to Heidkamp & MacInnes of White Plains, N. Y.

(Continued on next page)

## REACH HIGH...DIG DEEP



THE turntables on these two machines are twins but there the resemblance ends. One contractor wanted a highly mobile crane that could handle up to 110 ft. of boom with ease and precision. The other demanded a dragline mounted on a 2-speed chain drive crawler that could literally float on top of the job while lading out big yardages of mud and muck.

Both made their selection from the "Lorain-41 Series"—a complete line of shovels and cranes featuring one basic turntable design with a choice of crawler mounting or three types of Moto-Crane and Self-Propelled rubber-tire carriers. And both got the cream of the 1/4 yd. class for the "41" on any mounting with any type of boom is an outstanding performer. You can get complete details from your local Thew-Lorain distributor. Write or call him today.

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## Four Hot-Mix Plants For Maine Turnpike

(Continued from preceding page)

### 43 Bridges

The new Maine Turnpike has 43 bridge structures including grade separations, traffic interchanges, and river crossings. Contracts for their construction were let in 9 separate groups, with several of the smaller-size structures assembled in a single group. The largest bridges over the York and the Saco Rivers were each considered as a separate group or contract. These latter two spans were built by Ellis C. Snodgrass, Inc., of Portland, Maine, while the other 7 groups were all awarded on a low-bid basis to the Lane Construction Corp. of Meriden, Conn. The latter company parceled out a large amount of the work to ten other subcontractors. The total cost of the 43 structures came to \$4,770,000.

About the last bridge to be finished was a 330-foot 3-span structure over the Mousam River near Kennebunk, at approximately the mid-point on the Turnpike. Actually there are two bridges, paralleling each other 50 feet apart on center lines, each carrying one of the 24-foot roadways. They have common concrete abutments stretching across the full width of the structures, but each bridge has two separate sets of concrete piers. The end spans are 100 feet, while the center spans between center lines of piers are 130 feet. The superstructure consists of structural steel girders designed for H20-S16 loading, and carries a reinforced-concrete deck. Each bridge has a 28-foot roadway. The transition from the 24-foot pavement width to the greater bridge width is made in 25 feet.

### Steel H-Beam Piles

Both abutments and the north set of pier bents rest on 12-inch 53-pound steel H-beam piles that have a maximum length of 94 feet under the north abutment. Under the pier bent their average length is only 19 feet. They were driven to rock by a Vulcan No. 2 single-acting steam hammer handled by a crane, and each pile has a 60-ton bearing capacity. Both pier bents are well back from the bank of the river, so all the construction was on dry land and no cofferdams were required for this particular bridge. The soil at the bridge site is a mixture of clay, gravel, and sand.

Work on the Mousam River crossing started early in November, 1946. Some piles were driven and footings excavated before the weather halted activities by the end of the year. The job was resumed in April, and by August the substructure was completed.

The concrete footing-type abutments are 106 feet 9 inches long x 5 feet 10 inches wide, and average 6½ feet in depth. No piles were required on the south or No. 1 bent which is founded on ledge rock. The footings are 10 x 6 x 3 feet 3 inches deep, and support a pedestal 6 x 6 x 2 feet. From the pedestals rise twin piers, 3 x 4 feet in section, and 15 feet apart on centers. They are 40 to 44 feet tall, and are joined half-way up with a 3 x 3-foot concrete cross brace. On top is a concrete cap 30 feet long x 3 feet wide x 5 feet deep. In bent 2 the footings are 9 x 12 x 3 feet 3 inches, and support a 6 x 5 x 2-foot pedestal. Wood forms were used, and concrete was supplied from a central batch plant at Wells, with truck-mixers delivering the concrete to the site.

### Steel Superstructure

The steel superstructure consists of four principal girders, 5 feet 6½ inches deep back to back of angles, and on 8-foot 3-inch, 7-foot 0-inch, 8-foot 3-inch spacing on centers across each bridge. Floor girders, 30 inches deep, connect the main girders at an average of 19-foot intervals.

Not until October was the steel delivered to the job. It was both fabricated and erected by the American Bridge Co. of Ambridge, Pa. From the Boston & Maine RR siding at Saco, the steel members were hauled on trailer truck to the bridge site, and unloaded with a Manitowoc Speedcrane with a 60-foot boom.

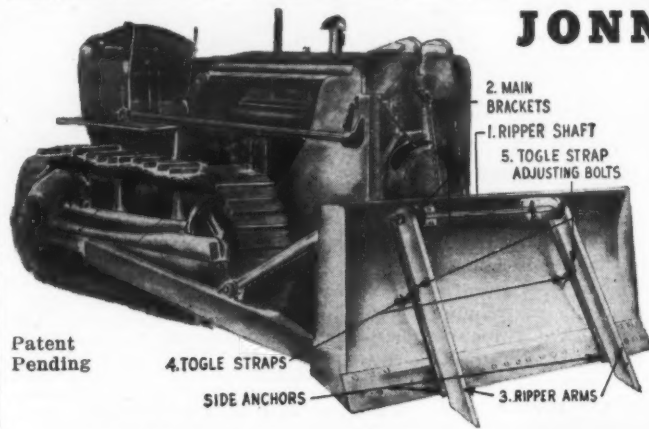
The erecting was done with an American Bridge Co. traveler, a 50-ton stiff-leg derrick which had a 45-foot mast and a 105-foot boom, and was powered by a 2-drum gasoline hoist. The rig worked from the two inside girders on each bridge, setting the steel as it advanced. Within 15 days all the steel was in place, held together with bolts 2 to 4 inches long or with drift pins.

Then work began on driving the 14,000 rivets which now bind the many members together into a unified permanent framework. Three riveting gangs of four workers each drove the ¾-inch rivets at the rate of 300 rivets for each gang over a 9-hour day. The gang was made up of a heater who tossed the hot

rivet to a catcher who, in turn, passed it to the buckler and riveter who drove it in place. They used both Ingersoll-Rand and Chicago Pneumatic riveting

hammers in this operation.

Air for the hammers was supplied by a Chicago Pneumatic 500-cfm compressor. (Concluded on next page, Col. 3)



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Two Blue Brute Portable Compressors powering four Blue Brute UMW-40 Wagon Drills, breaking ground for the Franklin D. Roosevelt Veterans' Hospital near Peekskill, N. Y. Part of the All-Blue-Brute equipment used for rock excavation by the Mt. Vernon Contracting Corporation of Mt. Vernon, N. Y., sub-contracting for Merritt, Chapman & Scott of New York City and Fred J. Brotherton of Hackensack, N. J.



When a big-time contractor goes all-out for one make of equipment, it's time to sit up and take notice! That's what happened last summer, when the Mt. Vernon Contracting Corporation was awarded the sub-contract of excavating, grading and remodeling the 383-acre site of the huge, \$22,400,000 Franklin D. Roosevelt Veterans' Hospital at Cruger's Park, N. Y.

For rock excavation, the Mt. Vernon Corporation selected Worthington Blue Brutes—100%—nine 500' and two 315' Blue Brute Portable Compressors, fourteen Blue Brute Wagon Drills and eighteen Blue Brute Hand-Held Rock Drills. Equipment—

wise from long experience, Mt. Vernon executives knew they could count on Blue Brutes for top performance all day—every day—under the toughest going.

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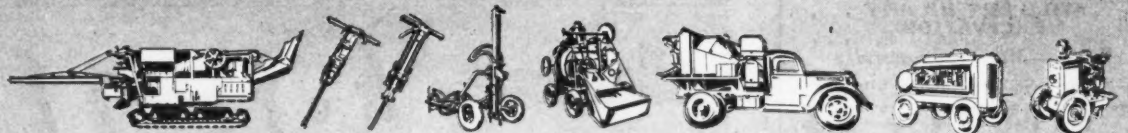
Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

### WORTHINGTON

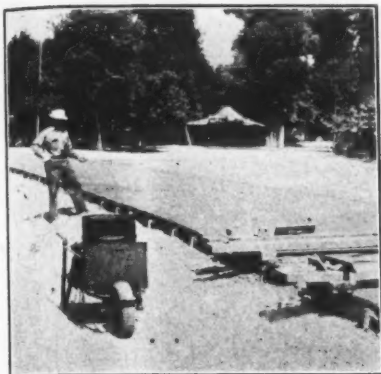
Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

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Konkure concrete-curing membrane is being applied with a Konkure power-driven spray unit. The rig has a 1½-hp gasoline engine and a fan-type nozzle.

## New Curing Membrane And Spray Equipment

Concrete-curing membranes and the equipment for applying them are made by the J. R. Anderson Co., 3814 Fletcher Drive, Los Angeles 41, Calif. Konkure membranes, when applied to moist uncured concrete, are designed to adhere firmly and to form an impervious film over the surface. This film seals in the moisture necessary to the proper and complete hydration of the cement, thus effecting a uniform and efficient cure throughout the mass.

Konkure is made in four types—clear, white-pigmented, black, and black No. 11. The clear contains a deep-orange dye for visibility of application. This dye fades out leaving the concrete its natural color and finish, the manufacturer states. It sprays readily at 20 to 30-pound pressure by hand or power-driven spray equipment. The white-pigmented membrane has the same qualities and general characteristics as the Konkure clear. A white-pigment paste is added and thoroughly mixed to form a product of uniform consistency. It is sprayed at 40 to 50-pound pressure.

The Konkure black has a special blend of asphalts and pigments mixed in a petroleum solvent. It is sprayed at 80 to 100-pound pressure. The black asphalt film left on the surface gradually disappears, leaving the concrete with a dull-gray non-glare finish. The company explains that the treated surfaces do not require a bonding agent for built-up waterproofing, or a binder coat for a top course of asphaltic concrete. The black No. 11 is similar to the standard black except that it is of a consistency which permits spraying by means of hand-operated spraying equipment at pressures of from 25 to 30 pounds.

The Konkure spraying equipment is made in two types—the hand-spray orchard-type equipment and the special power-driven unit. The hand outfit is carried by means of a shoulder strap. It has a 5-inch opening for filling and cleaning, and its nozzle is designed to provide an 18-inch fan of material. The pump assembly is removable with the tank top. The unit has 3½ feet of solvent-resisting hose, and solvent-resisting washers are used throughout.

The power-driven unit has a 1½-hp gasoline engine, which drives a hard-steel gear pump. The pump is equipped with a pressure gage and relief valve which is adjustable for the desired

pressures. According to the manufacturer, the excess material not required for proper spraying is by-passed back into the 15-gallon material tank which keeps the material thoroughly agitated. The machine is equipped with 50 feet of solvent-resisting hose and a special fan-type nozzle. It is also available with a compressor and air-storage tank and a 2-line spray gun.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 21.

## Mack Truck Appointments

Four district managers have been appointed by Mack Trucks, Inc. C. E. Cole is District Manager in charge of the Los Angeles branch, located at 1501 So. Central Ave. Lawrence D. McLean will head the Reading, Pa., office, located at 1212 Moss St. T. H. Jones heads the Charlotte, N.C., branch at 1400 So. Mint St. And William Dudde is in charge of the Bronx, N.Y., office, located at Leggett Ave. and Barry St.

## Four Hot-Mix Plants For Maine Turnpike

(Continued from preceding page)

pressor which was hooked to a vertical receiving tank, 8 feet high x 5 feet in diameter. From the tank at the end of the bridge a 2-inch pipe line carried the compressed air out to each riveting gang.

### Quantities

The major items in this Lane Construction Corp. contract, known as Contract 7, Group 5, included the following:

Excavation	576 cu. yds.
Steel H-beam piles.	
12 x 12-inch x 53-pound	3,925 lin. ft.
Concrete	575 cu. yds.
Reinforcing steel	62,000 lbs.
Structural steel	1,084,000 lbs.

The bid price on this Mousam River bridge was \$254,899. G. D. Helmers was Superintendent for the contractor.

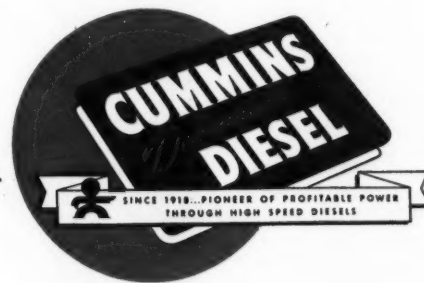
### Personnel

The Maine Turnpike Authority which

sponsored the construction and now operates the highway consists of four members headed by Joseph T. Sayward, Chairman. Lucius D. Barrows, Chief Engineer of the Maine State Highway Commission, is Secretary-Treasurer of the Authority; and Williams B. Getchell, Jr., is Executive Director.

Howard, Needles, Tammen & Bergendoff, Consulting Engineers, who designed and supervised the construction of the Turnpike, were represented on the work by L. D. Brown, Project Engineer. Resident Engineers on the north and south half of the project were, respectively, H. J. Kibler and N. C. Watkins; L. E. Olson was Operating Engineer. The consulting engineering firm selected Stewart Associates, Inc., of Cambridge, Mass., to handle the laboratory work and to inspect the asphaltic-concrete paving construction. F. H. Crabtree headed the laboratory and inspection staff.

Regular equipment check-ups will prevent costly breakdowns.



# See for Yourself...

how Cummins *Dependable* Diesels perform profitably on the toughest kind of jobs. Your Cummins dealer—a specialist in power application—will take you to jobs in your vicinity... can show you:

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The Speedmatic saw, which can be used as a hand saw or on a radial arm for bench work, comes in four sizes for cutting wood up to 4 3/4 inches thick. Its helical-gear drive is designed to deliver 98 per cent of the power of the motor for cutting.

### Double-Utility Saw Made in Four Models

A saw head which can be used as a hand saw or as a radial saw has been announced by the Porter-Cable Machine Co., 1805-1 No. Salina St., Syracuse 8, N. Y. It is built in four sizes for cutting wood up to 4 3/4 inches thick. Feature of the Speedmatic saw is its helical-gear drive, which is said to deliver 98 per cent of the power of the motor for cutting. The saw is designed so that the handle is above the center of gravity to make hand use easier.

The Model K-75 is powered by a 3/4-hp ac and dc 110-volt motor. The saw blade is 7 1/2 inches in diameter and has a 5/8-inch hole. Maximum depth of cut is 2 1/2 inches, saw speed under load is 4,500 rpm, and the unit's net weight is 15 pounds.

The K-88C is powered by a 1-hp ac and dc 110-volt motor. The blade is 8 inches in diameter and has a 5/8-inch hole. Maximum depth of cut is 2 3/4 inches, saw speed under load is 4,500 rpm, and the weight is 17 pounds.

The BK-10 is powered by a 1 1/4-hp ac and dc 110-volt motor. The blade is 10 1/4 inches in diameter and has a 3/4-inch hole. Maximum depth of cut is 3 3/4 inches, speed under load is 3,500 rpm, and the weight is 25 pounds.

The BK-12 is powered by a 1 1/2-hp ac and dc 110-volt motor. The blade is 12 inches in diameter and has a 3/4-inch hole. Maximum depth of cut is 4 3/8 inches, saw speed under load is 2,500 rpm, and the weight is 37 pounds.

When used as a radial saw, the base of the radial arm is bolted to a rigid metal frame 35 x 35 inches in size, equipped with detachable legs. An oak cutting table, 17 x 40 inches, is mounted on this supporting frame. It has a removable back stop. The vertical column is cast iron and can swing 60 degrees to the right or left. A ring clamp is designed to hold the base firmly when clamped at any angle. The slide head provides 7 inches of up and down travel. The slide bar is made of 2 1/4-inch hollow steel, and travels 27 inches on eight sealed bearings in the head. The mounting bracket can be quickly changed from crosscut to rip position by a half turn of the handle. This head is provided with an adjustable hold-down arm for ripping. Weight of the complete rig, not including the saw, is 340 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 41.

### Staff Changes for Heil Co.

Several promotions have been announced by The Heil Co. of Milwaukee. Wm. E. Simons has been named General Sales Manager for all six sales divisions. Formerly he was Sales Manager of the Truck Body and Hoist Division.

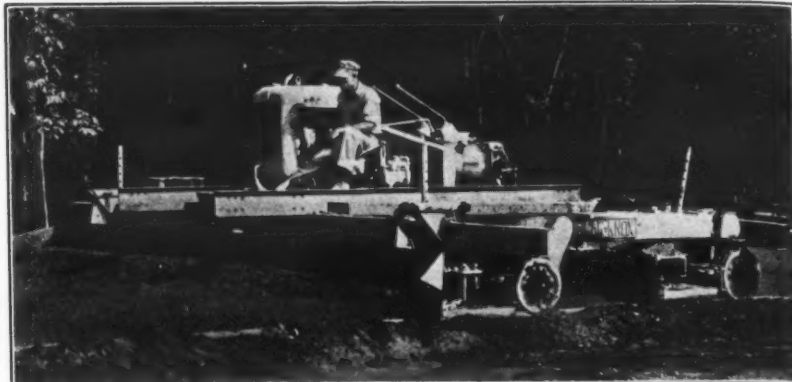
Harry F. Pugh was named Vice President in Charge of Sales and Advertising; Arnold F. Meyer, Vice President in Charge of Engineering; and Joseph J. Rosecky, Vice President in Charge of Manufacturing.

### Finisher Features Selective Control

An improved concrete paving finisher has been announced by the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh 22, Pa. Known as the Model XE, it features independent control of traction and screed speed. The Model XE replaces the earlier Model XC.

It provides sixteen combinations of screed and traction speeds through a special automotive-type transmission. The manufacturer especially recommends this improved model for use with air-entrained concrete.

The finisher is equipped with an adjustment for setting the crown, and the screeds have a telescopic width adjustment. The end trucks are of unit-type construction, and for width changes they are moved over on the main structural members. These main members are solid one-piece I-beams. The steering and brake control mechanism has been simplified on the new model; a new adjustment has been provided on



A special automotive-type transmission gives the improved Blaw-Knox Model XE finisher 16 combinations of screed and traction speeds.

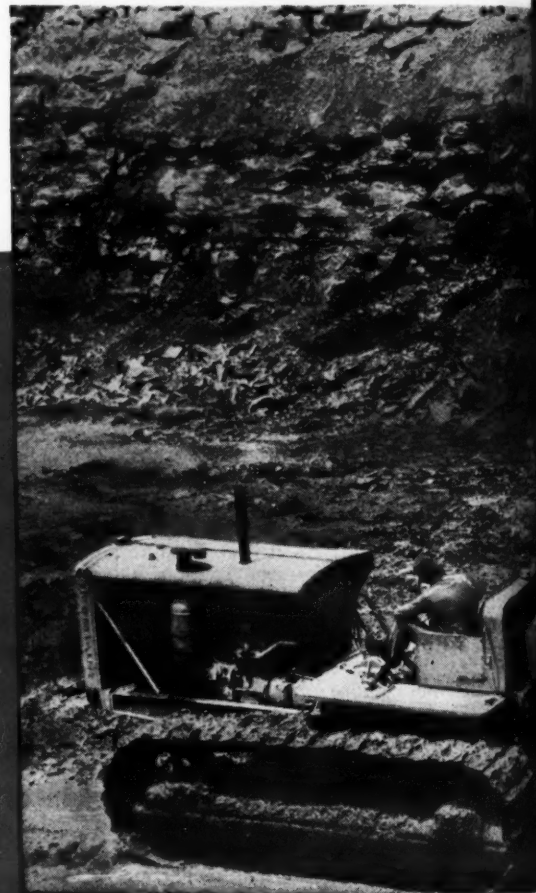
the chain drives from the transmission to the horizontal traction drive shafts; and improvements have also been made in the hydraulic screed-lifting system.

Power is furnished by a Continental PF-162 gasoline engine which develops 27 hp at 1,250 rpm without the vibratory paving attachment, or 32.5 hp at

1,620 rpm with it. Another feature is a V-belt drive with automatic take-up to absorb the shock of starting and stopping, to reduce maintenance, and to provide quieter operation.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 9.

# ASSURE GREATER OPERATING ECONOMY



Keep engines clean  
by lubricating with  
**Texaco Ursa Oil X\*\***

Tune in . . .  
TEXACO STAR THEATRE  
every Wednesday night  
featuring Gordon McRae  
and Evelyn Knight . . .  
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# TEXACO

### Form-Engineering Catalog Lists Complete Form Line

A catalog of information on concrete forms and form design has been made available by the Williams Form Engineering Corp., 1501 Madison Ave. S. E., Grand Rapids 7, Mich. It contains 66 pages of data on the Williams line of concrete forms, ties, clamps, and related equipment. This company also makes securing devices for all types of concrete forms including those for bridges, dams, retaining walls, roads, beams, and other structures. The equipment is available for either rental or purchase.

The catalog lists complete specifications, and pictures illustrate the set-up, construction, and use of Williams forms on many jobs throughout the United States. Tables are included for the most economical designing of forms as prescribed by Williams' engineers.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 78.



A Caterpillar No. 12 motor grader, on Goodyear tires, fills a badly eroded ditch on a farm in Karnes County, Texas. This scene is typical of soil-conservation demonstrations which took place throughout the nation during the past year and are to be continued in 1948.

### Soil Conservation Series

District and county officials of the soil-conservation service in Texas re-

cently completed a series of demonstrations of conservation practices. Attending the demonstrations were contractors and soil-conservation experts, who witnessed the building of water-diversion levees and ponds, and the newest methods of soil-erosion control.

These soil-conservation projects served to emphasize the importance of pneumatic-tired machinery in terrace building and other earth-moving projects. Advantages claimed for this type of equipment include better compaction and finish, and more efficient operation.

### Chicago Mgr. for Atlas

D. J. Carroll Copps has been appointed Chicago District Sales Manager for the Explosives Department of the Atlas Powder Co., Wilmington, Del. He succeeds J. H. Buchanan, who has resigned to enter private business. The Chicago district includes Illinois, Minnesota, Wisconsin, and parts of Indiana and Michigan. Offices are in the Field Bldg.



**P**UT Texaco Ursa Oil X\*\* in your heavy-duty engines — gasoline or Diesel — and reduce fuel consumption and the cost of repairs and maintenance.

Texaco Ursa Oil X\*\* is fully detergent, dispersive, and resistant to oxidation. It keeps engines clean . . . prevents deposits of sludge, varnish and carbon that steal power . . . assures free rings and valves . . . protects bearings from corrosion . . . reduces wear. For the best and thriftiest engine operation, lubricate with Texaco Ursa Oil X\*\*.

For chassis parts of trucks, tractors, graders

and other equipment, lubricate with *Texaco Marfak* — the world-famous chassis lubricant that lasts longer on the job . . . seals out dirt and moisture. And give crawler track mechanisms full and lasting protection with *Texaco Track Roll Lubricant*.

To get the best performance . . . most economically . . . from *all* your equipment, follow the Texaco Simplified Lubrication Plan. For details, call the nearest of the more than 2500 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

## RUD-O-MATIC TAGLINE

*Provides positive, steady tension — holds buckets steady under all working conditions.*



*Spring tension holds buckets steady. No weights, pins, tracks, or carriages. Cable saving more than pays for RUD-O-MATIC. Compact—easily installed. Eight models to fit all bucket sizes.*

RUD-o-MATIC Taglines are used as standard equipment by most crane manufacturers. Spring tension is powerful enough to hold a clam shell bucket steady. Operates with boom at any angle. Compact — it can be installed in less than thirty minutes. No pins, weights, tracks, or carriages to wear or be replaced. Taglines are complete with fairlead U bolt clamping plates, and cable attached. Immediate delivery — see your equipment dealer — or write —

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RUD-o-MATIC combination Magnet Reel and Tagline . . . operates on spring tension principle with tagline attached to magnet to steady — and electric cable fastened to magnet connections with all slack needed to prevent cable from being pulled or jerked loose from connections. Exclusive with RUD-o-MATIC.



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## Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

# Added Water Supply To Serve Wright Field

**New Augmented Facilities Include Deep Wells, Five Miles of Pipe, Reservoir, And Chlorinator Buildings**

✦ WRIGHT-PATTERSON Fields near Dayton, Ohio, which are the headquarters for the Air Materiel Command of the U. S. Army Air Forces, have a land area of about 7,000 acres. Buildings at this huge base have a total floor area of 11,733,608 square feet. And at this time around 16,000 civilians are employed within the gates. These few statistics suffice to show that the plant must have a water-supply system all its own, large enough for its needs. During the last war the water supply was, at times, insufficient. This condition has just been remedied by the construction of additional water-supply facilities for Wright Field, Area B.

Last autumn the Bass Engineering & Construction Co. of Birmingham, Mich., completed a \$640,620 contract which had been awarded in March, 1946, by the War Department, Corps of Engineers, Louisville Engineer District, with headquarters at Louisville, Ky. The contract for the new facilities included laying more than 5 miles of cast-iron water mains, ranging in size from 6 to 30-inch diameter; and building a reinforced-concrete covered reservoir with a storage capacity of 370,000 gallons, a fire pumping station, and two chlorinator buildings. Besides these main features the project included considerable modification to existing well pumps and equipment, as well as the installation of new pumps, motors, miscellaneous machinery, and valve vaults.

## New Deep Wells

All this additional water is coming from five new deep wells drilled in an undeveloped section of Patterson Field, which is separated from Wright Field by the tracks of the Erie and New York Central Railroads and by State Route 4, a dual concrete highway between Dayton and Springfield. The well drilling was done under a subcontract during the 1945-46 construction season by the Layne-Ohio Co. of Columbus. Over all this area the water table is high, and water can be struck when only 5 or 6 feet below ground level. However, the new wells were drilled through gravel strata down to limestone rock at a depth of 80 to 85 feet below the surface. The five wells are 18 inches in diameter, and each has a capacity of 1,500 gpm.

Included in the Bass contract was the pump installation for the five new wells. Because of the danger from floods in the near-by Mad River and its potential threat to the pumping equipment, steel towers supported on concrete foundation piles 25 feet long x 14 inches square were erected at each well. A platform in each tower, about 32 feet above the ground, holds the electrically driven Worthington deep-well turbine pump. Power is supplied from an overhead power line. The pumps may be set in operation either manually or by remote electrical control.

## Pipe Lines

From each well a 12-inch cast-iron pipe leads to the new water main, also cast iron, which increases from 14 to 24-inch as it picks up the flow from the five wells. The wells are also connected by a 16-foot road which has a 6-inch gravel base and is topped with a single bituminous surface treatment. The cast-iron pipe used on the job, from 6 to 30-inch diameter, was supplied by the U. S. Pipe & Foundry Co. of Birmingham, Ala. It was shipped by rail to the Erie and New York Central Railroads'

siding within the military reservation. The pipe lengths have bell and spigot joints which were sealed with lead and oakum. Surplus pipe material used on the job was procured by the Government to the extent of \$44,626 worth.

For the 24-inch water main which runs from the new well field 6,000 feet to the new reservoir, a trench was dug with a 3-foot minimum width and a 6-foot minimum depth. The average trench excavation was from 7 to 10 feet deep, and as wide as the bucket that was making the cut. Certain heavy equipment used on the job was rented as it was needed, since from the nature of the work the contractor could not keep the bigger machines busy all the time. Consequently, the rigs came and

(Continued on next page)



Everybody has commented on the really beautiful four color illustrations contained in the VICTOR Bulletin Form 20 . . . it covers fine welding and cutting equipment . . . it will be yours, free, for the asking. Write us today for your copy.

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Asphalt Emulsion will be in greater demand due to the scarcity of petroleum solvents. Our twenty years of experience in this field is available to you, as we grant licenses to reputable contractors on a very reasonable royalty basis.

We furnish and install production units and train your personnel. We suggest you write for full details on the Lancaster process for emulsifying asphalt. Address: Lancaster Processes Inc., 620 Fifth Avenue, New York 20.

# KLING NEW ASPHALT ADDITIVE SAVES TIME AND MONEY ON HIGHWAY MAINTENANCE

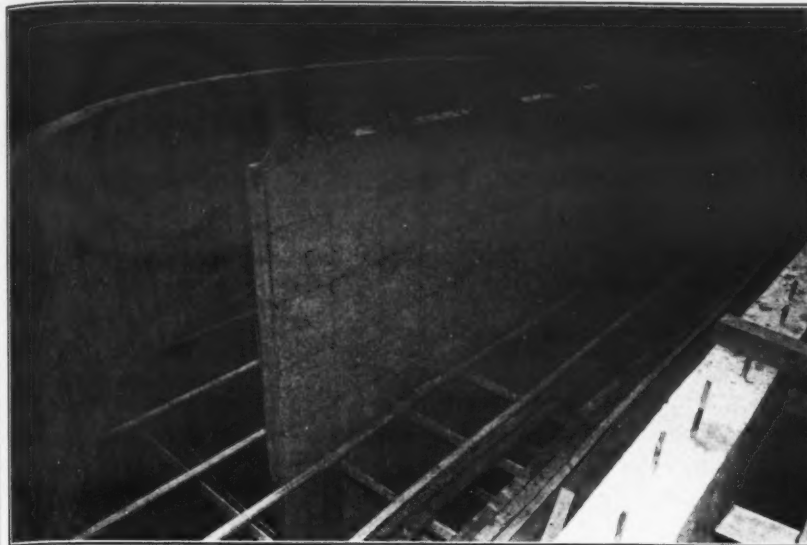
This new anti-strip asphalt additive assures a tough, durable cold patch even when applied under the most adverse conditions.

Patches and pavements using KLING can be successfully installed during rainy or freezing weather because the asphalt adheres to wet aggregate. You can save working days and make a better job by using KLING. Write for a descriptive folder to:

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U. S. AAF Official Photos

went when they were required. Three  $\frac{3}{4}$ -yard back-digging machines—a Koehring, Lima, and Northwest—did most of the trench excavation. They were also used in setting the larger pipe sizes which were mostly in 16 and 18-foot lengths. A lighter and more mobile Bay City truck crane handled the smaller sizes of pipe.

About 35 per cent of the trench excavation consisted of rock, which had to be drilled and blasted. Heavy steel-wire mats covered the shot area when the trenches were being opened around the buildings. Another 20 per cent of the trenches was dug through very wet ground. In the softer material shoring was often required, but the water problem was handled by digging the bottom of the trench a little deeper along one side to form a step. The pipe was laid on top of the step while the water collected in the sump trough from which it was pumped out. In this way the water did not interfere with either the setting of the pipe or the sealing of the joints. Half a dozen Jaeger 3 and 4-inch pumps were in use on the job to keep the water low in the trench while the pipe was being installed. They were also augmented with a few compressed-air pumps.

In rock cuts, a sand bed 6 to 9 inches thick was spread on the bottom of the trench to serve as a cushion for the pipe. At all bends, changes of alignment, tees, and crosses in the pipe line, a concrete anchor especially designed for that particular location was installed to support the pipe. In many instances where existing facilities were encountered in the line of the new pipe, hand digging was resorted to in order not to disturb the functions of whatever line was met.

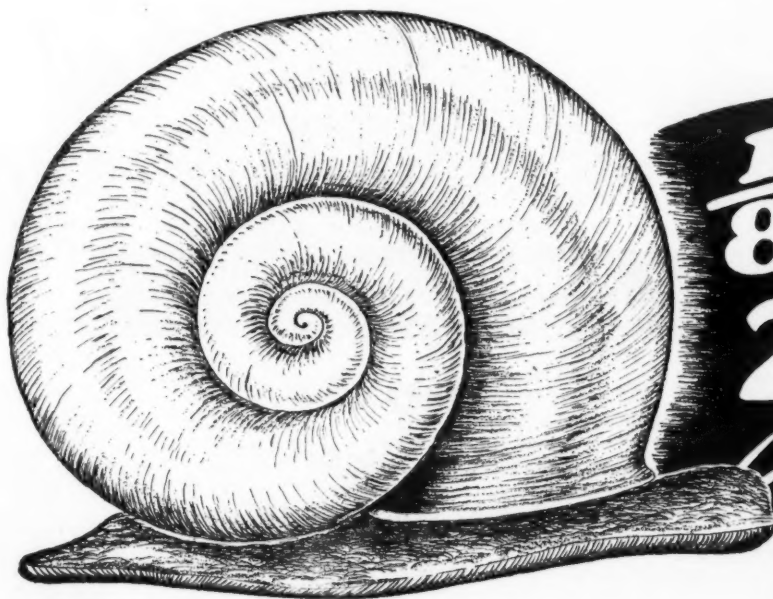
#### Crossing the Road and Railroad

When the 24-inch cast-iron pipe approached the tracks of the Erie and New York Central Railroads the digging was in solid rock. This permitted open-cut excavation. After the pipe was laid, it was encased in a concrete sheath with a minimum thickness of one foot.

Under the highway the material was less stable, so a 60-inch reinforced-concrete pipe was jacked under the dual lanes of State Route 4 for distances of 48 and 40 feet respectively. The shoves were made with 50-ton hydraulic jacks. The concrete pipe served as a

sleeve in which the water main was placed. Every 12 feet a concrete cradle (Concluded on next page)

These two views of the inside of the new chlorine-contact reservoir at Wright Field show the first set of shoring for the form work of the concrete roof slab (left) and the top set of shoring. You can also see the 10-inch-thick baffle walls.



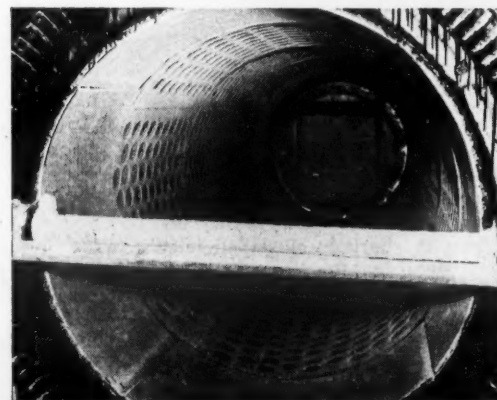
**$\frac{1}{8}$  inch  
in  
27 years**

## THAT'S ALL THE WEAR on these AMSCO MANGANESE STEEL SCREEN PLATES

... and it took the tumbling, abrasive battering of more than 7,000,000 tons of tough Illinois limestone to wear away this minor fraction of the original metal thickness. With a  $\frac{3}{4}$ " thickness remaining, these Amsco Manganese Steel Plates are still on the job in the revolving screen which handles rough sizing and facilitates distribution throughout the plant of the  $3\frac{1}{2}$ " to  $4\frac{1}{2}$ " material from the secondary crusher.

This is only a small part of the Amsco manganese steel used at our customer's plant. In the production of limestone for railroad ballast and other purposes, Amsco manganese steel slows wear on crusher jaws, mantles, bowl liners, and other parts to a snail's pace.

Ductile to resist impacts; polishing and work-hardening to resist abrasion... "the toughest steel known" fights the battle against wear on every front. Take a big slice out of costs and delays caused by equipment repair and maintenance—specify AMSCO MANGANESE STEEL CASTINGS for abusive service.



AMERICAN

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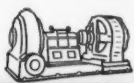
COMPANY

## AMERICAN MANGANESE STEEL DIVISION

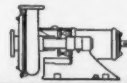
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MANGANESE STEEL CASTINGS  
"CHROME-MOLY" STEEL CASTINGS  
HARDFACING ELECTRODES  
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Digs, fills, dumps, spreads, bulldozes, quick and handy on all earth moving jobs. Fits John Deere, A & B, International M & H, Ford and Case.

Write for full details

General Welding Co. 3000 So. Lawrence Rd. Wichita, Kansas

## Added Water Supply To Serve Wright Field

(Continued from preceding page)

was set up within the pipe to support the 12-inch water main.

All the trenches were backfilled with sand which was compacted in 6-inch lifts by pneumatic tampers to a point 6 inches above the top of the pipe. Above that, the dirt was pushed into the trench with dozers and compacted by running the equipment over the backfill.

### New Structures

On the way from the new well field to the reservoir the water main passes through a chlorinator building. It is of brick construction, measures 25 x 18 feet, and is equipped with Wallace & Tiernan chlorinators to treat the water before it reaches the reservoir.

In the reservoir and control area are the two original concrete reservoirs of 250,000 and 300,000-gallon capacity, and an elevated water tank of 200,000-gallon capacity. A 20-inch cast-iron main runs 4,800 feet from the original well field containing five wells to these reservoirs, also through a new chlorinator house. The new reservoir, to augment the other two in the existing system, is also a cylindrical concrete structure built on a 27-foot radius and with a capacity of 370,000 gallons.

Its periphery rests on a circular concrete footing, 2 feet wide x 15 inches deep. From this the 12-inch exterior wall rises to a height of 22 feet 3 inches. The three baffle, or interior, walls are 10 inches thick. The entire structure is covered by a 6-inch concrete roof slab. The concrete for the reservoir was mixed on the job, but all the concrete for other parts of the project, such as the floors and foundations for the other buildings, manholes, valve vaults, etc., was bought from the Dayton Ready-Mix Concrete Co.

Adjacent to the new reservoir is the new fire pumping station, also a brick building, which measures 78 feet 7 inches x 28 feet. This is an important unit in the water-supply facilities since it makes available water at high pressure for fire fighting. The station contains four Peerless dual-drive horizontal centrifugal pumps of 2,500-gpm capacity, and equipped with both gas and electric motors. The pumps may be either manually or automatically controlled from the master switchboard. All the pipe connections in the station are drilled flange fittings bolted together, and the pipe will withstand a pressure of from 150 to 200 pounds per square inch. The Iowa Valve Co. supplied most of the valves on the system which range in size from 1 to 30 inches. Chapman cone and check valves were also used in certain locations.

The new water-supply facilities are tied in to the existing system which had to be kept in operation throughout the construction. The distribution lines, in various sizes, fan out from the reservoir area to service that part of Wright Field known as Area B. This augmented distribution required the construction of many manholes, pits, vaults, and chambers. A shortage of skilled labor and considerable rain in the spring and summer of 1947 delayed the work appreciably.



### Jobs Done Quicker, Cheaper

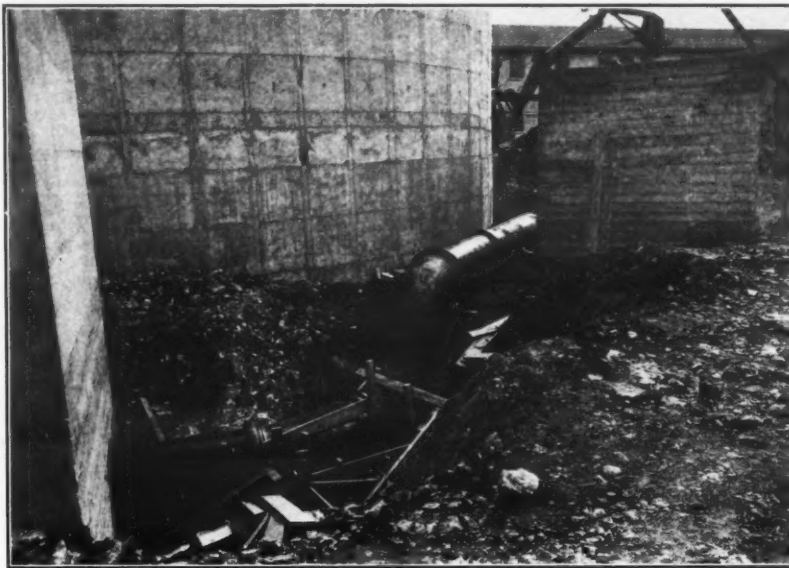
Attached to Tractors, Bulldozers, Motor Graders and Scrapers, the Automatic Slope-Meters are in use on the construction of highways, airports, dams and building sites. Slope-Meters are compact, sturdily constructed instruments that will automatically show the operator the exact grade or slope on which he is working.

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U.S. AAF Official Photo

This view shows the 24-inch connecting pipe line which runs from the new 370,000-gallon reservoir at Wright Field to the original 250,000-gallon reservoir.



America's Largest Builder  
of Material Handling Buckets

## SHOVEL PULL SHOVEL DRAGLINE CLAMSHELL

FRONTS, BOTTOMS, SCOOPS and TEETH shown in color on buckets are 14% manganese steel developing tensile strength up to 120,000 p.s.i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

*Experience Counts.* See your shovel man or equipment dealer about PMCO Buckets and Dippers.



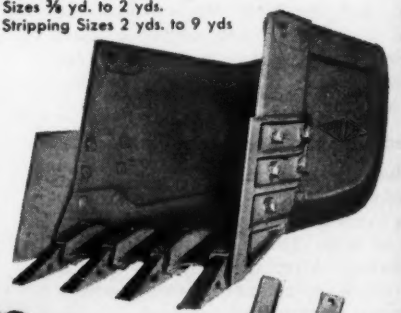
CLAMSHELL  
Sizes 3/4, 1, 1 1/2, 2, 3, 4, 5 yds.



SHOVEL  
Sizes 3/4 yd. to 18 yds.



DRAGLINE  
Perforated Sizes 3/4 yd. to 2 yds. 20%-40% lighter than other makes.  
Solid Sizes 3/4 yd. to 2 yds.  
Mine Stripping Sizes 2 yds. to 9 yds.



PULL SHOVEL  
Outside Cutter Widths:  
21", 26", 31", 36", 39"

On the 1/2 yd. and 3/4 yd. Shovel, Pull Shovel, and Dragline Buckets, all teeth are interchangeable—a great advantage to operators.



"Quality Since 1880"

**PETTIBONE MULLIKEN CORP.** CHICAGO 51, U. S. A.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES

### Personnel

An average force of 35 to 40 men was employed on the project under the field direction of C. L. Welch, Superintendent for the Bass Engineering & Construction Co. For the Corps of Engineers, Major O. M. Haney is Officer-in-Charge with headquarters at Wright Field. Field supervision was exercised by Foye A. Davidson, Inspector. The Louisville Engineer District, which is directing the work, is headed by Col. B. B. Talley, District Engineer.

### Twin Disc Sales Office

A branch sales engineering office has been opened in Los Angeles by the Twin Disc Clutch Co. of Racine, Wis. It is located in a newly constructed building at 2950 Leonis Blvd., and serves the territory of California, Arizona, and Nevada. General supervision of this area is under A. E. (Duke) Young, District Manager. Manager of the Los Angeles branch is Preston Olney.

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# Equipment Is Varied For Grading Needs

## Muck Replaced by Hardpan To Give High Compaction On New 3.37-Mile Section Of N. Y. State Thruway

THE 3.37-mile grading section of the New York State Thruway which was recently completed north of Syracuse presented some interesting problems in earth-moving. They were overcome mainly by a wise choice of equipment to suit the particular needs of the job at hand. One of the features of the project was the removal of a heavy stratum of muck, and its replacement with hardpan or glacial till from borrow pits. This substitution of good road-building material for muck, which was subsequently wasted, resulted in a hard, firm roadbed that more than satisfied the compaction requirements of the contract.

The New York State Department of Public Works awarded this grading job to D. W. Winkelman Co., Inc., of Syracuse, N. Y., on its low bid of \$930,385.50. Work began in November, 1946, and was completed in December, 1947, slightly more than a year later. This section is just a small portion of the overall 486-mile Thruway System that eventually will run from New York City to Albany, then west to Buffalo, and on to the Pennsylvania line near Erie, Pa. It is on new location throughout.

The Winkelman contract lay in both the Ontario and Mohawk divisions of the Thruway, and extended from Buckley Road to Thompson Road in Onondaga County. Because of its close proximity to a large metropolitan area, where the acquisition of land with a soil suitable for road building would be prohibitive in cost, the Thruway is located in an area nearly devoid of usable embankment material. Consequently borrow pits were resorted to. However, no especially valuable parcels of land were taken even in providing a 250-foot right-of-way.

### Typical Thruway Sections

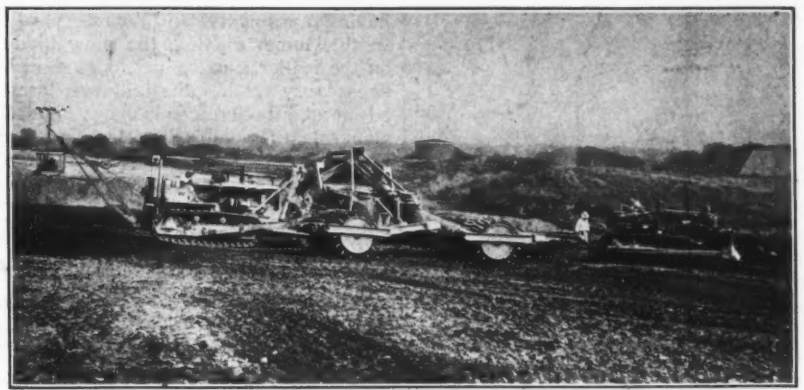
Each direction of travel on the Thruway will have a roadbed wide enough to provide a 37-foot 3-lane pavement, 12-13-12-foot in section. The finished shoulders are 10 feet wide. Between the two opposing traffic lanes is a 20-foot-wide mall with its center depressed 1 foot 9 inches below the center-line crown grade. When the cuts and fills are under 10 feet in depth, the side slopes are 4 to 1; over 10 feet they are 2 to 1. The necessary transition is made in 200 feet.

Every 700 feet a drop inlet is constructed in the depressed mall, and the water collected is carried off to the side by a reinforced-concrete pipe culvert having a minimum size of 24 inches. The water intercepted by the drop inlet is picked up from the surface as well as from a 12-inch vitrified-tile pipe running the entire length of the job. In all cuts a 6-inch tile under-drain has been laid in the shoulders 3

feet from where the edge of the future pavement will come. The flow line of all the tile is about 3½ feet below the finished surface. Underdrain trenches were dug by either a Barber-Greene ditcher or a Byers ¾-yard backhoe. The backfill was made with No. 2 crushed stone, all passing a 1½-inch screen.

### Structures and Drainage

Not included in this contract are six major bridges to eliminate crossings at grade on this section of Thruway. The job did, however, include two large reinforced-concrete drainage structures: a 36-foot span bridge on a 30-degree skew over Ley Creek; and a twin-box 9 x 12½-foot culvert, 168 feet long, on a 26-degree skew. Both



C. & E. M. Photo

Working on all for the New York Thruway near Syracuse are a D8 and a FP Carryall, a tractor-dozzer, and a TD-14 pulling two dual sets of Blaw-Knox sheepfoot rollers

of these are supported on timber piles because of the poor bearing qualities of the silty subsoil beneath. Truck-mixed concrete was supplied by Clark Ready-Mix Concrete Co. of Syracuse, a 5-mile haul to the job.

Also on account of the poor subsoil,

culvert pipe was not installed until after the fills were completed. Then the trenches were dug and the pipe was laid. This insured a firmer foundation and a better alignment for the pipe. Most of this excavation was done

(Continued on next page)

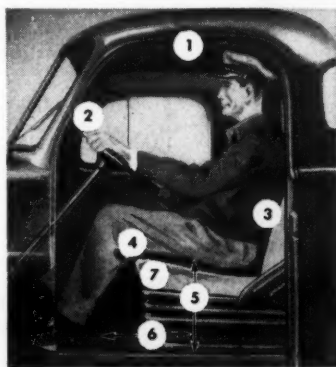
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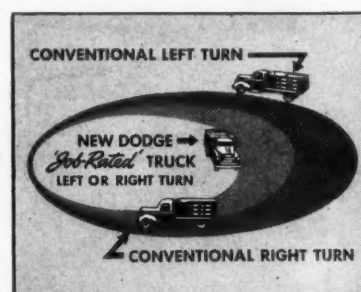


Comfort? Riding is believing! New and better weight distribution, wider tread axles and longer springs give a marvelous new "cushioned ride." "Air-O-Ride" seats give the kind of seat cushion you want—"soft," "medium," or "firm," controlled by a convenient lever. Seven full inches of seat adjustment provide exactly the right legroom. All-season comfort is yours, too, with "All-Weather Ventilation," an ingenious combination of truck heater, defroster vents, vent wings, and fresh air intake.

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| 1 PLENTY OF HEADROOM   | 4 PROPER LEG SUPPORT<br>... under the knees where you need it.      |
| 2 STEERING WHEEL<br>right in the driver's lap.                                 | 5 CHAIR-HEIGHT SEATS<br>... just like you have at home.             |
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| 7 "AIR-O-RIDE" CUSHIONS... adjustable to weight of driver and road conditions. |   |

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C. &amp; E. M. Photo

A Bay City crane with a 30-foot boom lowers a section of 24-inch reinforced-concrete pipe into a culvert trench. Because of poor subsoil on the Winkelman grading contract, this pipe was not installed until after the fills had been completed.

### Equipment Is Varied For Grading Needs

(Continued from preceding page)

by a Bay City crane with a 30-foot boom and a  $\frac{3}{4}$ -yard dragline bucket. The crane also lowered the pipe into position.

When work was begun on the project in 1946, Ley Creek meandered over most of the right-of-way. During the winter about 70,000 cubic yards of muck and silt was excavated to relocate the creek in a channel 7,900 feet long south of the Thruway. The channel was cut out by a Northwest dragline with a 65-foot boom and a Yaun 3-yard lattice-type bucket. All the digging was done from timber mats.

#### Muck Stratum

Stretching over a major portion of the job was a stratum of muck from 1½ to 7 feet deep, with an occasional pocket going down as far as 10 feet. Only for 2,000 feet at the east end and for a 500-foot section at the west end was there solid material on which to build a road. The big Northwest dragline, working from timber mats and digging continually under water, cast the muck far out on either side of the center line of the Thruway. Not until last summer, however, was any progress made in backfilling this cut with suitable material. Heavy rains during the first half of 1947 prevented the contractor from replacing the muck with clay hardpan or glacial till discovered in a borrow pit that was opened up south of the highway. Soils maps of the Highway Department spotted suitable locations for investigation.

Before any material could be moved from the borrow pit, the contractor first had to build a haul road which cost about \$10,000. The average haul from pit to job was only 1.7 miles, but Ley Creek had to be bridged with a sturdy wood and steel span capable of taking the heavily-loaded earth-movers. The haul road also crossed a section of muck and the widely spread tracks of the New York Central Railroad's main freight line.

The hard-packed glacial till of the pit was loosened by a Southwest ripper pulled by a Caterpillar D8 tractor. The till was so hard that only a single tooth could be used on the ripper, and usually this had to be replaced daily. Following the ripper came a Euclid loader pulled by a D8 tractor. Its plow blade cut a swath 18 inches deep x about 24 inches in width as it moved over its 1,100-foot run—the maximum possible distance that the loader could operate in the pit without having to make a turn.

#### Compacted Glacial Till

The Euclid loader passed the material over its belt and dropped it into a fleet of 16 bottom-dump Euclids, each

having a capacity of 13 cubic yards. In this tough digging, the plow blade on the loader usually had to be sharpened every week. One unit was loaded in about 40 seconds as it moved alongside the loader. On the fills the Euclids dumped their loads which were spread out by two D8 tractor-dozers. In the beginning, at the bottom of the fills, the material was spread in layers just thick enough to support the equipment over the wet, soggy ground. As the embankment progressed the till was placed in 6-inch layers.

About 200,000 yards of material was taken from the pit with this equipment working two 8-hour shifts. Light for night work was provided by four Kohler and four Universal 5-kw light plants. Floodlights were erected on skid-mounted towers which could be easily shifted about to where they were needed. The haul road was kept in good shape by continual blading with two Caterpillar No. 12 motor graders.

Only so much at a time could be  
(Continued on next page)



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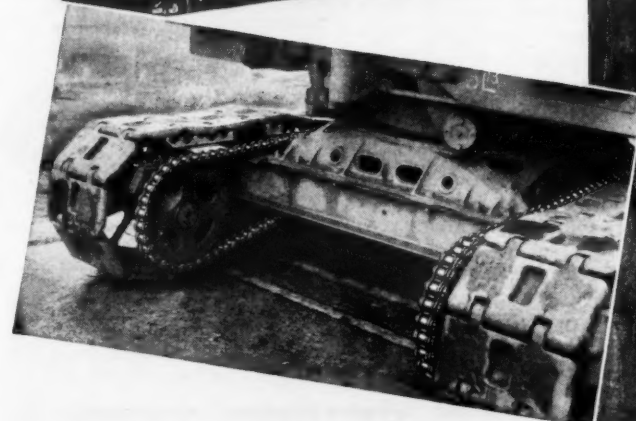
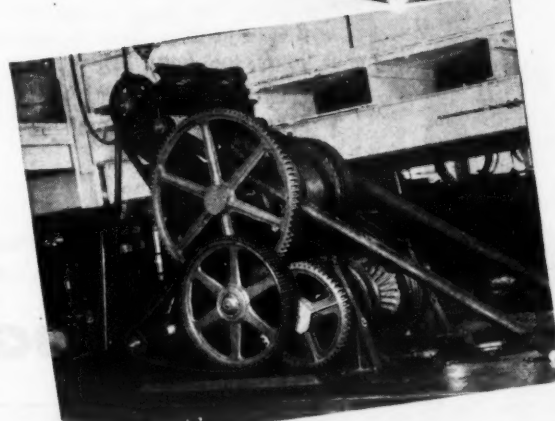
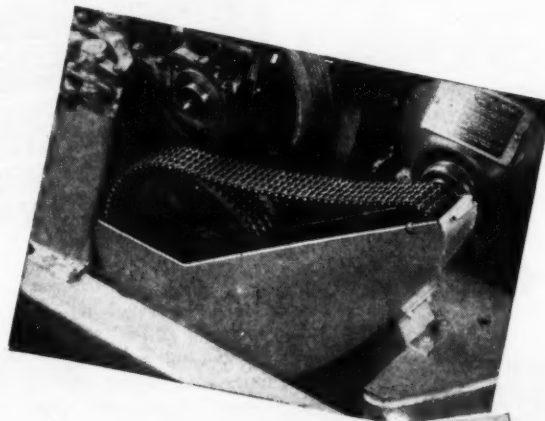
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## To Eliminate Trouble and Noise

Excerpt from letter from construction contractor:

"We wish to change from a gear train drive to a chain drive on our . . . . Dragline to eliminate the trouble we are presently having. The gears are: one engine pinion, intermediate and driven gears.

"We have used your multiple strand chain drives on other makes of machines and like the performance and trouble-free operation, as well as the elimination of noise."



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scraped off the surface of the borrow pit because of the underlying moisture. When the stratum became too wet, either excavating was stopped to give the material a chance to dry out, or else the material was spread on the fill in shallow lifts and aerated by disks and harrows.

The fills were built up with the hardpan to within a foot of the finished foundation subgrade. Then the final foot of embankment was added with sand taken from another borrow pit, an average distance of a mile from the center of the job. A Marion 2½-yard dragline with a 50-foot boom excavated the sand, the Euclids hauled it, and the dozers spread it in two 6-inch layers.

Below the final 4 feet of embankment the required compaction was 90 per cent of Proctor density at optimum moisture; in the upper 4 feet this percentage was increased to 95. These figures were met, and passed, with a density at times reaching 106 per cent of Proctor. Compaction was achieved with four different sets of dual-drum sheepfoot rollers which were loaded with water and sand to develop a pressure of from 300 to 500 pounds per square inch. Of these, three sets were Blaw-Knox, and the fourth LeTourneau. They were usually rigged with two pairs of dual-drum rollers to a set, pulled by either International TD-14 or Caterpillar D6 tractors. With only one pair of rollers six passes were necessary, but with the dual set the number of passes with the sheepfoot rollers was reduced to three.

The optimum moisture for the best compaction of the glacial till was between 10 and 13 per cent; for sand it was higher—from 15 to 17 per cent. Water was pumped from Ley Creek into two Federal tank trucks holding 1,600 gallons each. When the work was near the former Army Air Base, water was obtained from fire hydrants. Spray bars at the rear of the trucks distributed the water by gravity.

Towards the end of the day the embankment was rolled by a Buffalo-Springfield 12-ton 3-wheel roller to remove the marks made by the sheepfoot rollers. Thus if rain should fall during the night the water would not soak into the fill through the impressions left by the tamping rollers.

#### Other Equipment

On some of the longer hauls averaging 1,200 feet, out of the cuts, three Super C Tournapulls were used with FP Carryalls holding 15-yard heaped loads. They were snatch-loaded by a D8 tractor. For short hauls, which averaged 800 feet, three LeTourneau FP Carryalls pulled by D8 tractors moved 13 yards of pay dirt or 15 yards of heaped dirt each. Either a TD-18 or a D8 tractor helped in the loading by pushing from the rear. An average of 4,000 yards was moved daily. The scrapers and Tournapulls worked only one shift. Three end-dump Tournatrailers, holding 10 yards, also were



C. & E. M. Photo

Photographed on the recent New York Thruway grading job, a Euclid loader passes hard-packed glacial till over its belt and drops it into a bottom-dump Euclid.

added to the fleet of earth-moving equipment, and used on long hauls.

A foundation course of gravel was next laid on top of the graded surface. On the fills it extended the full width of the roadbed from out to out of shoulders, 12 inches thick, laid in two layers

of 6 inches each. In cuts it was placed to lines 3 feet beyond the edge of the future pavement, and also to a thickness of 12 inches. An 8-inch layer of gravel was laid in the center mall. In some cuts, where a wet silt was encountered, the undesirable material

was removed to a depth of 2 feet and replaced with gravel.

The gravel was obtained from a pit an average haul distance of 3 miles from the job. A Northwest 80-D 2½-yard shovel loaded the material into a fleet of 20 dump trucks holding 5 yards each. After the trucks dumped the gravel, it was spread by dozers and shaped by the graders, with the sheepfoot rollers looking after the compaction. All the gravel had to pass the 4-inch sieve, and be suitably graded as to coarse and fine particles. The gravel was also rolled with the smooth-wheel roller which had a better effect than the sheepfoot where larger-size material was being used.

#### Care of Equipment

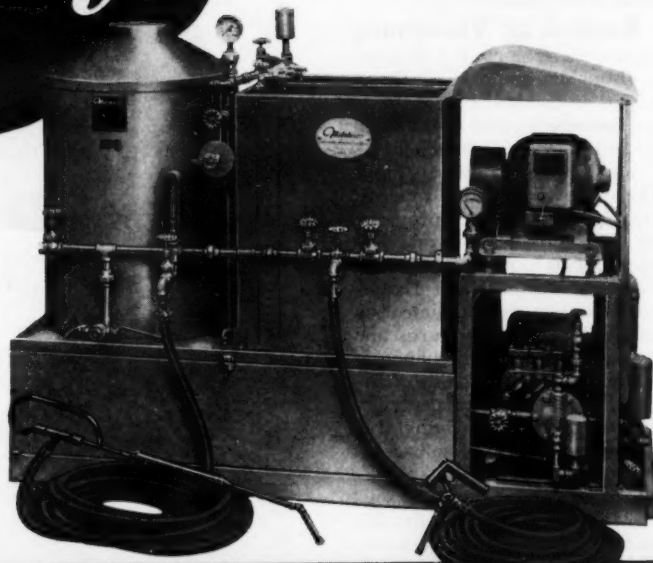
The C. E. Mills Co. of Syracuse furnished Atlantic fuel and RPM Delo oil products to the equipment on the job. A service truck with a greasing unit lubricated every piece of equipment once during a shift of work. As the

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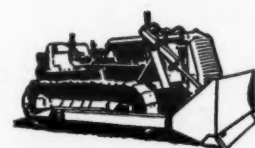
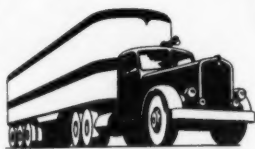


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**HIGH PRESSURE & LARGE VOLUME...** that's the secret of speed, economy, profit in cleaning. Only the Malsbary High Pressure Combination Cleaner delivers large volumes of super-heated cleaning solution, hot and cold water, under pressures of 0 to 400 lbs. Only the Malsbary gives five different cleaning combinations by turning a valve. These features covered by basic patents.

Amazingly trouble-free...proved by 10 years' service. Used and endorsed by hundreds of progressive firms who know Malsbary quality and economy.

#### FIVE EXCLUSIVE FEATURES

Only with Malsbary can you get these five different cleaning actions with one machine...for every cleaning need:

**1. HIGH PRESSURE "STEAM"** cleaning up to 200 lbs. pressure (to 7 GPM) removes heavy grease, tar, asphalt, etc.

**2. HIGH PRESSURE HOT WATER** up to 325 lbs. pressure (10-20 GPM) for oil, grease, de-icing, other cleaning.

**3. HIGH PRESSURE COLD WATER** up to 400 lbs. pressure (15 or 30 GPM) for caked mud, dirt, clay, etc.

**4. LOW PRESSURE WARM WATER** to 30 gals. per min. for washing by hand.

**5. STEAM** at 15 or 30 h. p. volume for de-gassing, sterilizing, cleaning asphalt tanks, etc.

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## Equipment Is Varied For Grading Needs

(Continued from preceding page)

contractor's headquarters are in Syracuse, all major repairs were done there when necessary. A shop was also set up in the field in one of the buildings at the former Army Air Base. This was a wooden frame building, 100 x 40 feet, with a concrete floor and two 10 x 10-foot doors on one side. Windows were on all sides and overhead were two rows of electric lights. The place was used chiefly for storage purposes and contained a stock room for small parts and also a field office for the construction supervisory personnel.

### Quantities and Personnel

The major contract items included the following:

Excavation	561,000 cu. yds.
Pipe underdrain, 6-inch	5,700 lin. ft.
Pipe underdrain, 12-inch	17,000 lin. ft.
Concrete for structures	1,970 cu. yds.
Reinforcing steel	124,300 lbs.
Gravel foundation course	86,500 cu. yds.
Timber piles	17,000 lin. ft.

A force of 100 men was employed by D. W. Winkelman Co., Inc., under the direction of K. C. Fuller, Project Manager, and Keith T. Karns, Superintendent.

For the New York State Department of Public Works, J. F. Boyle was Resident Engineer. The project is located in the 3rd District of which William Robinson is District Engineer with headquarters at Syracuse.

### Qualified Engineers

#### Needed at Vicksburg

The Waterways Experiment Station, an agency of the Mississippi River Commission, Corps of Engineers, Vicksburg, Miss., is in immediate need of qualified hydraulic, soil-mechanics, mechanical, electrical, and concrete-research engineers. These men are needed to assist in a greatly expanded research program.

Work in the hydraulics laboratory is devoted to problems in river and harbor and flood-control engineering. Extensive experimentation is conducted on the design of hydraulic structures and on works required for maintenance of depths or alignment of navigable channels. The soils lab is concerned with routine testing and with original research in the development of soils-testing methods, equipment, and techniques. A special branch of the soils lab deals with the design of flexible pavements for airports. The concrete-research lab engages in major research activities pertaining to the basic improvements of concrete structures. The Research Center at the station serves as a technical information center for the Corps of Engineers, and is responsible for reports and publications on research investigations.

Persons who are interested in such work should submit applications on Civil Service Commission Form No. 57, which may be obtained from any First Class Post Office, mailed to the Director, Waterways Experiment Station, Corps of Engineers, P. O. Box 631, Vicksburg, Miss. Engineers who possess Civil Service status and are eligible for reinstatement, may be given permanent appointments. Those who are presently employed by the Federal government may be transferred at Government expense, provided the transfer is not for the convenience of the employee. At the present time, indefinite appointments pending establishment of Civil Service registers are being given to engineers, who subsequently will have an opportunity to pass Civil Service examinations for permanent status.

### Black & Decker Changes

Several changes in its sales organization and promotions in its staff have been announced by The Black & Decker Mfg. Co., of Towson, Md. The former



C. & E. M. Photo

Left to right are Resident Engineer J. F. Boyle, Assistant Construction Engineer E. R. Clegg, Project Manager K. C. Fuller, and Superintendent Keith T. Karns—supervising personnel on the Winkelman New York Thruway grading job.

sub-branch at Charlotte, N. C., has been established as headquarters for a new territory covering North and South Carolina. G. M. Buchanan, former Branch Manager at Baltimore, has been placed in charge of the new branch. Mr. Buchanan, in turn, is succeeded by J. P. Spain, formerly Sales Engineer at Chicago.

Arthur S. Boehm, former Sales Engineer at Pittsburgh, has been promoted to Branch Manager in charge of the San Francisco branch. He replaces A. W. Helbush, who has resigned. And several Sales Engineers have also been appointed. David Harrison will cover sales in the Baltimore territory; Harold Bond, New York; A. S. Fehsenfeld,

Chicago; Coy Quesenberry, Baltimore; Kenneth Schmelig, St. Louis; R. E. Stone, Los Angeles; L. C. Kaefer, Pittsburgh; Evan Davis, Pittsburgh; E. O. Gulley, Atlanta; and Nels Westerberg, Chicago.

### Large Scrapers at Work

A 16-page catalog on its scrapers at work has been issued by the Caterpillar Tractor Co., Peoria 8, Ill. Devoted exclusively to earth-moving problems, Folder No. 10748 describes loading, hauling, and spreading jobs. It covers the No. 60, 70, and 80 scrapers teamed with the Caterpillar D6, D7, and D8 tractors.

The catalog also points out several construction and operational features of the scrapers: controlled spreading, balanced sizes, cutting edges, flexibility, short turning radius, etc. It is well illustrated.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 77.



CP-2KW Portable Gasoline-Driven Generator and CP-220 High Frequency Electric Vibrators.

## New High Frequency Electric Vibrator

The CP-220 Electric Vibrator, weighing 30 pounds, is used for vibrating concretes 3" slump and over; for walls and columns under 15" thick; for light floor and roof slabs; and for precast piles.

Providing high frequency vibration, the CP-220

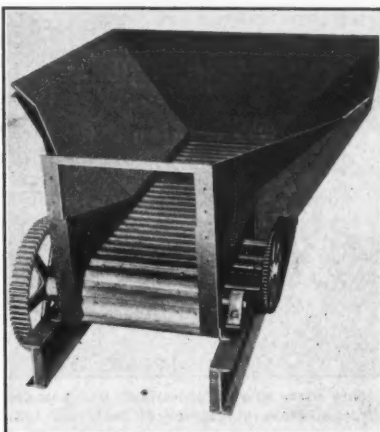
is built for one-man operation. Requires no flexible shafts, but has a long easily handled electric cable which minimizes movement of generator. Two CP-220's are powered with a CP-2KW gasoline-driven Generator, 120 volt, 3-phase, 180 cycle.

## Multi-Plane Throat Featured on Feeder

A new-model apron feeder has been introduced by the New Holland Mfg. Co., Mountville, Pa., a Division of the New Holland Machine Co. Feature of the Model No. 30 apron feeder is its multi-plane throat designed to prevent odd-sized stones from slipping into the neck and causing jams. It is made primarily for use with the New Holland double-impeller breakers, but is said to be adaptable to most stone-reducing units.

Controlled feeding is obtained through a V-belt drive connection to a 5-hp power unit. Mounted on the countershaft is an American reduction unit. There is a chain drive between the first and second countershaft, and a gear drive to the apron belt. The 4-inch-pitch steel apron conveyor belt travels up to 20 feet per minute.

Other features include pans which are  $\frac{3}{8}$  inch thick, dual roller carrier chains,  $\frac{1}{2}$ -inch-thick hopper plates,



A multi-plane throat to keep odd-sized stones from slipping back into the neck is a feature of the New Holland Model 30 apron feeder.

anti-friction bearings, steel drive gears, and a renewable wear strip at the lower edge of the hopper. Approximate weight of the Model No. 30, with drives, is

7,000 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 35.

## Data on Powered Barrow

A folder which lists the features of its powered wheelbarrow is being distributed by the Gar-Bro Mfg. Co., 2416 E. 16th St., Los Angeles 21, Calif. The Power-Cart is designed to handle and move material rapidly and with a minimum of man-power. The folder lists eight of the features claimed for this unit.

Pictures show the machine at work loading, carrying, and dumping. Among the operational features of the cart which are listed in the folder are its short turning radius; single-lever control of forward, reverse, and steering; etc. There is also a complete list of specifications and dimensions.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 67.

## CP Vibrators for every concrete job

Seven different types of CP Vibrators—pneumatic and electric—meet every requirement for mass or reinforced concrete jobs. Notable for rapid and economical operation . . . low power consumption . . . low maintenance costs.

### VIBRATORS FOR MASS CONCRETE

#### ONE-MAN TYPE

CP-417 Pneumatic, CP-419 Electric

For placing batches up to two cubic yards; as in shell and roller gate type dams, medium bridge piers, etc.

#### TWO-MAN TYPE

CP-518 Pneumatic, CP-519 Electric

For batches of two cubic yards and more, and compacting heavy, harsh concretes in open forms, as in gravity dams, and large bridge piers.

### VIBRATORS FOR REINFORCED CONCRETE

CP-219 Pneumatic

For concretes 3" slump and over; walls and columns under 15" thick.

CP-325 Pneumatic

For concretes under 3" slumps; walls and columns over 15" thick.



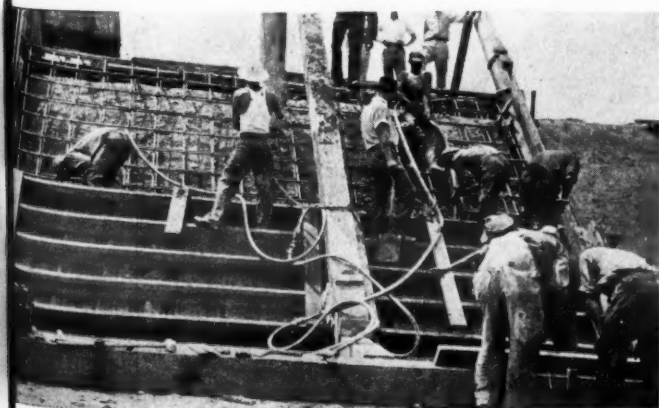
The CP-417 Pneumatic Vibrator for mass concrete—for batches up to two cubic yards.



Four men with two CP-518 Vibrators topped off this eight cubic yards of concrete in two minutes.



The CP-219 is notable for its low air consumption and economical one-man operation.



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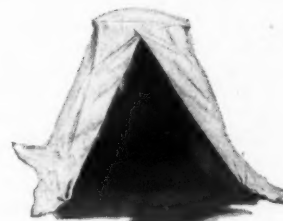
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Contractors and Engineers Monthly  
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# Big District Fights Maintenance Battle

## Bituminous Roads Beaten By Heavy Traffic Offer Interesting Problems to Busy Maintenance Crews

★ ONE of the most interesting highway districts in the southwest, from the standpoint of the variety of its maintenance problems, is District 24 at El Paso. Almost everything that can happen to a bituminous highway happens frequently in this westernmost outpost of the Texas Highway Department.

Situated in the rugged mountainous part of western Texas, district headquarters are remote from other parts of the state. It is 596 miles from El Paso to the state capital at Austin, and 900 miles to the east Texas cities of Beaumont or Texarkana. District Engineer P. S. Bailey is approximately as close to Tucson, Ariz., as he is to the southeastern part of his own district, some 296 miles away from headquarters!

Even so, every part of the 900-mile system of state highways in District 24 comes under the personal scrutiny of maintenance men at least three times a week and frequently oftener, especially on the transcontinental routes like U. S. 80 which cross the big district.

### Many Maintenance Problems

What these maintenance men find on their routine inspections runs just about the complete range of variety for their type of work. Pavement develops potholes, cracks, and rough edges. Sometimes the shoulders get too low at the pavement edge. Posts on curves need paint or repair. Weeds grow up. Guard fences give trouble by needing paint or repairs.

As if the pavement and shoulders were not enough, the ditches, right-of-ways, and culverts also have their own peculiar problems, as we shall see a bit farther along. The district is in the heart of the southwest desert, commonly thought of as arid. But while it has a rainfall of only 9 inches a year, it fights some of the worst flash floods in that section. Often about half of the yearly rainfall comes pouring down in a 3-hour cloudburst.

### District Covers 6 Counties

District 24 comprises six of the westernmost counties of Texas: El Paso, Hudspeth, Culberson, Jeff Davis, Presidio, and Brewster. This area has some of the roughest terrain in Texas, including the Davis Mountains, up to 8,382 feet high. Guadalupe Peak has an elevation of 8,757 feet. State highways rise to an elevation of 5,790 feet through this part of the district, and drop to 2,594 feet in other parts. For the information of those who think of the Texas highway system in terms of monotonously flat country, some of these mountain roads in District 24 have grades as steep as 9.75 per cent.

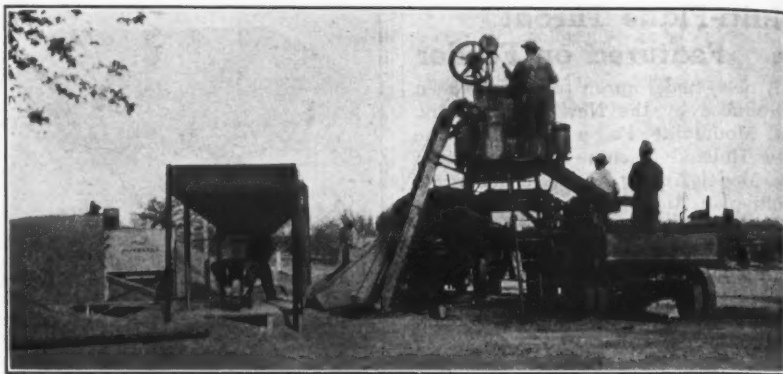
On the other hand, the district also has its share of level grades, and boasts one section of perfectly straight highway 27 miles in length. This kind of

contrast gives variety to the work.

The district has a total of 901 miles of highways, generally ranging from 18 to 24 feet in width. There is a 40-mile stretch of 4-lane pavement on U. S. 80 west of El Paso, with more of this modern type of highway now entering the contract stage. But for the most part the battle with maintenance concerns two-lane pavement.

Only 22.6 miles remain unsurfaced in the district, and this stretch is now under contract. There are about 15 miles of concrete pavement. All the remainder is bituminous-surfaced construction, set on a flexible base.

Fortunately, a plentiful supply of flexible-base material exists in all parts of the district. Extreme hauls of 10 miles are sometimes encountered, but



This view shows pre-mixed patch material being mixed in District 24 at El Paso, Texas. Note stockpiles at left, the transfer hoppers, the mixer and oil truck, and finally the truck which hauls the material away to the stockpile.

generally the pits are closer than that. The country abounds in deposits of gravel and caliche, and these materials make excellent sub-base.

Highway engineers in District 24 encounter problems of an international nature in design, construction, and

maintenance, because the district is bounded on the south by the Rio Grande, the U. S.-Mexican boundary.

For the 1947-48 season, the maintenance budget called for the expenditure of \$365,887.

(Continued on next page)

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**District Organization**

District Engineer P. S. Bailey heads the district, with Victor Searcy as District Maintenance Engineer. Mr. Bailey and Mr. Searcy have both seen many long years of service with the Texas Highway Department. Mr. Searcy has passed the 25-year mark and is well on his way towards the rare 30-year award.

Seven maintenance foremen work under Mr. Searcy's supervision. Two of these are located in El Paso, each with his own shop and yard, at district headquarters. Maintenance foremen are also found at Sierra Blanca, Van Horn, Fort Davis, Marfa, and Alpine. Alpine is 220 miles from El Paso, so a small equipment-repair shop is also located there.

Each maintenance foreman has a gang of from 10 to 18 men, and is responsible for a section of road from 100 to 170 miles in length. The maintenance men who work near El Paso, where transcontinental traffic on U. S. 80 goes up to 20,000 cars a day, have shorter divisions, of course. The longer patrols are situated in parts of the district where the traffic count is not high.

These maintenance foremen make a visual inspection of all parts of their road system at least three times a week. They keep a notebook up to date, and plan their own work as far ahead as possible.

The District has about 175 pieces of construction and maintenance equipment, with central control over its distribution at El Paso. Each maintenance foreman, however, has assigned to him constantly five dump trucks, a 300-gallon American asphalt heater, a 3-ton Ferguson maintenance roller, and a rubber-tired Allis-Chalmers tractor. These Allis-Chalmers tractors achieve great versatility, by working with motor-grader blades in the spring and fall, and doubling as mowers in the summer.

In addition, the District has two new Hough Payloaders which are used to load trucks. These machines are shifted between foremen as needed. Two International-mounted front-end loaders are used the same way. Four heavy-duty motor graders are likewise shifted between foremen to keep them working as efficiently as possible. Two of these machines are Caterpillar, two are Adams.

The district organization is designed to give the best possible routine maintenance and inspection to the highways, and to have a reserve force of equipment for use in any emergencies. The maintenance crews use the latest methods, as standardized by the Texas Highway Department, which apply to their problems. And they have plenty of leeway to improvise methods to fit any problems peculiar to them.

For instance, the light snows which fall in west Texas are handled by snow-plow blades shop-built to fasten on behind a dump truck. This blade is nothing more than a castaway motor-grader moldboard, suspended behind the truck on a framework of steel. It is raised or lowered to the right position by the dump bed, and is highly effective at a speed of about 20 to 25 mph. It was first developed in the neighboring district

at Pecos, and imported because it filled a need.

**Maintenance Inspections**

In highway maintenance work, as in almost any undertaking, there is a certain set of values to consider in applying priorities to the most important parts of the work. When main-

tenance foremen in this district inspect their sections of highway, they look first at the riding surface, then at shoulders and slopes, at ditches, and finally at the right-of-way and bridges or culverts.

There are a number of typical conditions which they find and repair in the following order of priority:

**Pavement:**

1. Potholes in surface.
2. Rough riding surface.
3. Broken edges.
4. Cracks in pavement.
5. Center stripe hard to see.

**Shoulders and Slopes:**

1. Low at edge of pavement.

(Continued on next page)

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C. & E. M. Photo  
District Engineer F. S. Bailey, left, heads Texas Highway Dept. District 24 at El Paso, with Victor Searcy, right, as Maintenance Engineer.

## Big District Fights Maintenance Battle

(Continued from preceding page)

2. Narrow and in need of repair.
3. Water in ditches cutting toe of slope.
4. Posts on curves need repair or paint.
5. Weeds need mowing.
6. Guard fences need repair or paint.

### Ditches:

1. Blocked by grass or obstructions.
2. Erosion eating the sides.
3. Dams or diversions causing damage.

### Ditch and Other Right-of-Way:

1. Signs need removal, repair, or replacement.
2. Brush on curves needs removing.
3. Grass, trash, and weeds need removing.
4. Side-road approaches need clearing.
5. Trim or remove trees.

### Culverts or Bridges:

1. Outlet and inlet blocked, check drainage.
2. Markers or buttons need replacement.
3. Check any damage to structure.
4. Check erosion at abutments.
5. Structure needs painting.
6. Check underpinning.

Some of these concrete bridges, incidentally, pose real problems in hydraulics. Flash floods often fill up the inlet approaches to bridges with sand, boulders, and trash which has to be removed. Sometimes when the stream bed is plugged, the streams cut new courses. Riprap bank protection is useless, even when it extends well into the toe of the channel bed. Whenever additional funds are available, the District makes channel changes and approach rectifications to structures to minimize damage and filling.

### Bituminous Highway Patching

Bituminous patches, and in some cases the complete upper-decking of short sections of highway, make up the biggest and most important single item of work for District 24 maintenance men. It has been demonstrated again and again that a smooth-riding surface comes first in importance with the traveling public.

Two outfits of men and equipment travel around over the district to pre-mix and stockpile the material used for this work. The outfit consists of a Kwik-Mix Dandie 14-S mixer, a steel transfer hopper, a front-end loader, and wheelbarrows.

The material is mixed according to Texas Highway Department specification 303-A, which calls for the following:

Aggregates	Per Cent Retained
1/4-inch	0
3/8-inch	0-10
No. 10	95-100
Uvalde Rock-Asphalt Dust	Per Cent Passing
3/4-inch	100
Bitumen content, 6 to 9 per cent	
Bitumen	Type RO-3

The pre-mixed material is weighed out on the basis of 75 per cent of rock aggregate, 25 per cent of Uvalde rock-asphalt dust, and 4 1/2 per cent by weight of RO-3 road oil. The mixed material has better stability if it is allowed to cure a few weeks in the stockpile.

Crushed-rock aggregates for this mix usually come from commercial producers in El Paso. The rock-asphalt dust is shipped in by rail from Uvalde, and stored in the main yard. The road oil comes in by tank car, is heated by a booster heater, and transferred to storage tanks in the highway yard. Very often, when pre-mixed material is made up in remote parts of the district, the materials go directly to that point insofar as possible, and the crew and its equipment works at that place. Stockpiles of about 1,000 tons are generally mixed at a time.

The patches are applied regardless of shape, but are laid in such a manner that they smooth up any surface irregularity. It is a characteristic of Texas Highway Department maintenance that

a patched road is as smooth as new construction, or smoother.

Considerable widening work has also been done with this material. The mix is laid down in a form trench by a spreader hopper, smoothed down by a steel drag behind one of the Allis-Chalmers tractors, and then rolled down tight by some of the extensive roller equipment in the district.

Surface patching is so important that

the District has five permanent maintenance camps in some of the most remote spots, where men stay and work day after day. The Highway Department furnishes and maintains the cook-house and bunk shacks at these places, and the men take care of their own cooking and supplies. Some of the men have their families with them. It is a lonely life, but healthy and interesting.

(Concluded on next page)

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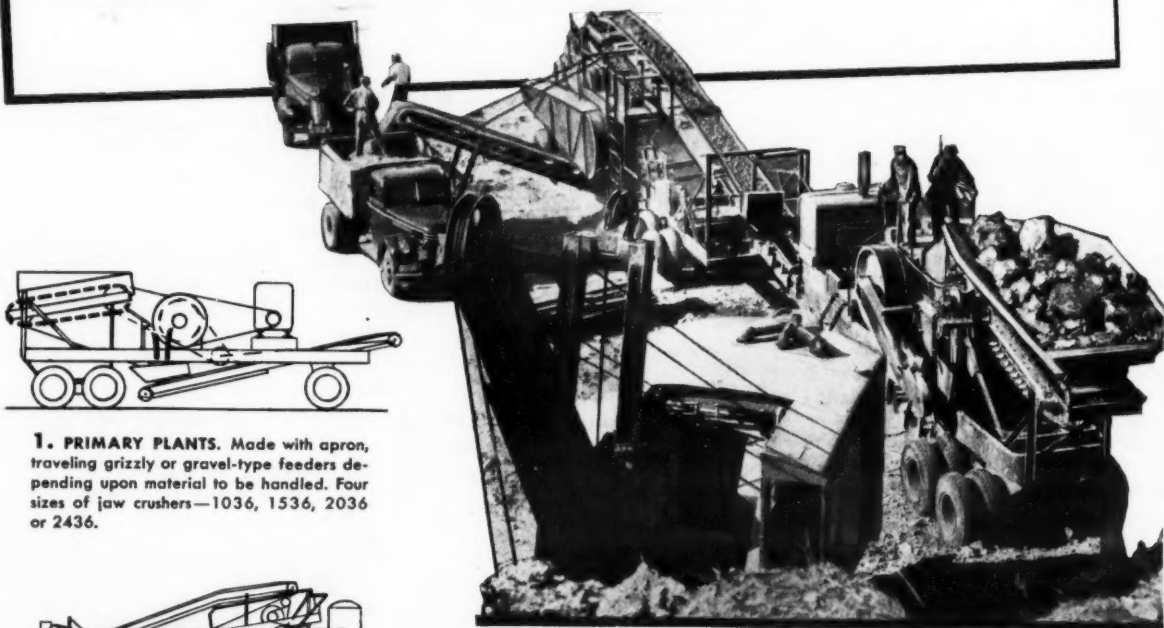
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### Repair Shop

District headquarters, at the east edge of El Paso, mark the control center for the far-flung area. There are the main administration buildings, the testing laboratory, a sign shop, carpenter shop, blacksmith shop, and central equipment-repair shop. The last two named are high on the list in importance, for it is there that most of the equipment is repaired.

The District uses standard factory parts for the repair of equipment, but in addition it makes quite a bit of extra bracing, framework, and so on in its own shops. The main repair shop is equipped to handle any kind of major repair to engines or drives on any of the equipment, and its well stocked parts room contains approximately a \$50,000 inventory of various equipment parts.

In the repair shop are located the following machines which help with repairs:

- 1 Sunnen L.B. grinder
- 1 Sioux valve refacer
- 1 Black & Decker 3/4-inch drill press
- 1 Sioux grinder
- 1 South Bend 16-inch lathe
- 1 Hall ES valve-seat grinder
- 1 Champion air compressor
- 1 Van Norman rebaring bar
- 1 Sunnen cylinder hone
- 1 60-ton hydraulic press
- 1 Wright hoist
- 1 electrical testing set
- 1 Hammett fast battery charger

The blacksmith shop, where much of the heavier work is done, has the following equipment:

- 1 Lincoln electric welding machine
- 1 Canedy-Otto 21-inch drill press
- 1 Queen City grinder
- 1 Armstrong-Blum power saw
- Anvil and miscellaneous blacksmith tools

This shop installs additional bracing where it is needed on the frames of some of the machines, it refaces scarifier teeth on motor graders, and does hard-facing work at points on equipment where the wear is severe. Stoddy self-hardening and tube-borium welding rod is used in great quantities.

This District finds that its lathe pays dividends in making special parts. The cost of this work is nominal when a district machinist does it, but is prohibitive in some of the El Paso shops where that kind of work is done. The District has a new lathe on order, so that this type of work can continue to be done at its yard.

With more and more traffic now using the southwest gateway to the Pacific coast, the District is getting a progressively tougher job of highway maintenance each year.

D. C. Greer is State Highway Engineer at Austin, and George B. Finley, the genial State Maintenance Engineer, is in charge of maintenance for the Texas Highway Department. And although this district is 596 miles from their office, neither Greer nor Finley is a stranger in El Paso.

### Ryerson's Pittsburgh Plant

A booklet prepared by Joseph T. Ryerson & Son, Inc., describes the facilities and services offered by the company's newly modernized Pittsburgh



C. & E. M. Photo

Highway District 24 at El Paso handles the light snows which fall in western Texas with snow-plow blades shop-built to fasten on behind dump trucks.

plant. It is entitled "Ryerson Steel Returns to Pittsburgh".

The catalog begins with a letter by the plant manager and a photograph of the members of the sales and customer-service staff. It then describes the

Ryerson plant, comparing it to a department store for selling steel and steel services. Many photographs taken in the plant show the steps required in the stocking and shipping of steel. The general procedure followed by

Ryerson to speed the delivery of steel is also described.

Copies of this literature may be obtained without obligation by using the enclosed Request Card. Circle No. 57.

### Lighted Tally Board

An illuminated tally board has been brought out by the Clyne Mfg. Co., 2619 Colerain Ave., Cincinnati 14, Ohio. Called the Tally-Lite, it consists of a tally board equipped with a battery-operated light. The company recommends it for use in checking or making out reports in work areas where there is insufficient light.

The Tally-Lite has a 3-volt bulb with a heavy filament, and it uses three standard flashlight cells. Total weight of the unit equipped with batteries is 24 ounces. The board is made of a heavy, long-lasting material. It is equipped with a heavy-duty spring clamp.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 37.

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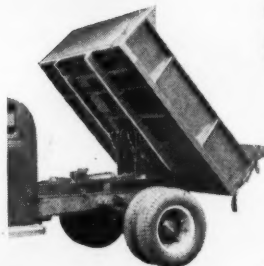
# The Hercules Aircreter



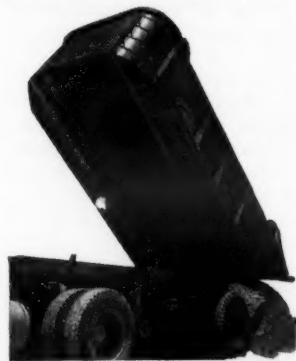
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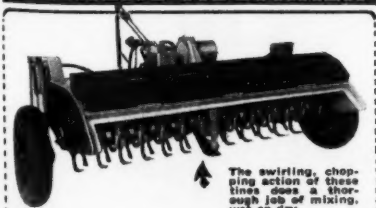
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## Highway Officials Hold 24th Meeting

**North Atlantic States Assn. Discusses Current Road Problems, Costs, and Personnel; New Officers**

HOW to provide better highway service in view of current construction costs was the general theme of the 24th annual convention of the Association of Highway Officials of the North Atlantic States. Over 1,400 delegates attended the meeting held in Atlantic City, N. J., March 3-5.

In his annual address, President Walter B. McKendrick, Assistant Chief Engineer, Delaware State Highway Department, outlined the varied and complex problems which have faced the member states since the post-war highway program was given the green light in October, 1945. These included the new high-level price structure, lack of engineering personnel, materials shortages, and labor difficulties and inefficiency. For the days ahead, sound planning and financing are essential, he added. And he suggested some remedies for these problems, including stage construction, greater use of machine operations, and the deferment of work which requires much hand labor and costly materials.

A study of the status of highway work in the eleven member states leads to the following conclusions, he said:

1. The extension of Federal Aid under the Federal-Aid Highway Act of 1944 was of vital importance. Without it, states would have had great difficulty meeting the deadline. As it is, most highway departments will have been able to use the funds available under the Act by the 1948 deadline.

2. Member states of the Association lead in the primary-highway program, but are lagging in urban work.

3. In the field of maintenance, a yeoman job has been done. But it is necessary to stretch the maintenance dollar still further. Most states have replaced large maintenance labor forces by small highly mechanized crews in an effort to reduce costs and increase efficiency.

4. The severe weather conditions of the past winter have taken a great toll, and drastic measures are necessary to protect the highway investment. A number of states have reduced both axle and gross-load limits below the legal limit to prevent excessive breakup of the roads. But in spite of precautions, roads of all types are in bad condition and much reconstruction will be necessary. President McKendrick pointed out, however, that the newer roads in which soil mechanics played a role during construction are standing up well.

On the ever important subject of traffic safety, McKendrick reported that Massachusetts, Connecticut, and Rhode Island lead the nation in low highway-accident rates. He stressed the responsibility of all to increase highway safety, but urged more education in individual driver responsibility.

Lack of trained engineers is holding up the highway program, he said. An HRB-AASHO committee reports the need of 31 per cent more professional engineers, and 50 per cent more semi-professional employees. The number attracted to highway departments will continue to be small, President McKendrick predicted, unless something is done to adjust the scale of salaries and bring them in line with those paid elsewhere and with current living costs.

Theodore G. Morgan, a Past President of both the Royal Automobile Club of Canada and the Canadian Good Roads Association, brought greetings

from Canada and told the assembly something about Canada's road problems. He expressed the indebtedness of Canadian highway engineers to the interest, support, and help of engineers in the United States. He closed by presenting to Charles H. Sells, Superintendent, New York State Department of Public Works, an illuminated address from the Royal Automobile Club of Canada in appreciation of Mr. Sells' service to Canada in putting his training and experience at the disposal of her highway engineers.

### Publicity and Public Relations

Featured speaker at the first session was Spencer Miller, New Jersey State Highway Commissioner, who discussed publicity and public relations. In the broadest sense, he said, this subject is concerned with the whole problem of democratic government, as government by consent means government by information.

Since highway departments are entrusted with the expenditure of enormous sums of public money, highway officials have a direct responsibility, Commissioner Miller said, to report to the public. The people pay for the highways, and the extent of their support for a highway program is in direct relation, Mr. Miller believes, to the extent to which they are taken into the confidence of their highway department, and the extent to which they feel they are getting their money's worth.

A good public-relations program rests on three P's, said Mr. Miller—Plans, Program, Publicity. Without a good highway program, there can be no successful public relations program, but far too often a good road program goes unnoticed for lack of a program for

informing the public. Commissioner Miller urged that all highway departments establish a public-relations bureau under a competently trained man. He should know how to handle publicity, be familiar with public administration, and understand the highway program, though he should not necessarily be an engineer. All media available should be used—press, magazines, radio, films, and speeches to citizen groups. Though the latter may sometimes seem onerous, Mr. Miller believes that it is the duty of department heads to go before responsible groups to dis-

cuss highway problems in general, and their relation to the interests of the particular group.

For public administrators and engineers, the task in public relations must be constant, continuing, and constructive, Commissioner Miller concluded. "A sound program of public relations is a vital part of our job as public administrators."

### The Highway Picture

Thomas H. MacDonald, Commissioner of Public Roads, reported on Federal. (Continued on next page)

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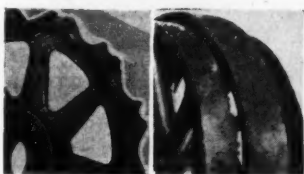
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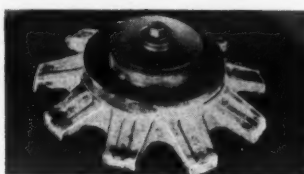
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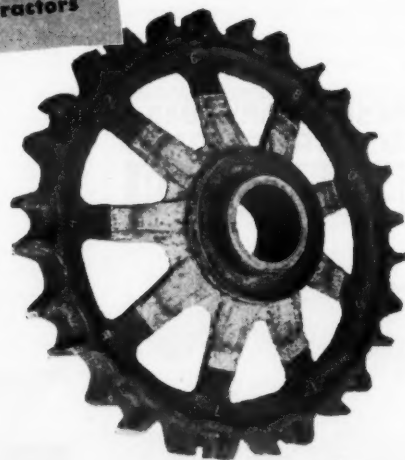
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Aid highway bills before Congress, and stressed the importance of a continuing highway program for national security and economic welfare. The start on our highway job has been good, he said. But to solve our secondary and urban-route problems, we need the type of cooperation which has resulted in our present primary-road system. For this he advocated the establishment of urban and secondary-road divisions within the state highway departments.

State highway departments must help the counties, he said. Only one-third of all the counties doing road work throughout the country have technical staffs.

One means of speeding up the secondary-road program, he said, might be to award longer contracts—as much as 50 miles or more. This should make that type of work more interesting to contractors and result in lower costs.

#### Personnel Problems

Both formal and informal discussion during the convention touched frequently on highway-department personnel problems. This was due, no doubt, to the fact that they constitute 95 per cent of all highway-department problems, according to R. P. Ellison, Executive Assistant, Virginia Department of Highways. In his paper on this subject, Mr. Ellison stated that most serious of all is the problem of attracting and retaining competent highway engineers in view of the low level of salaries as compared with those paid by railroads, contractors, and others in private industry.

In Virginia, Mr. Ellison said, as in many other states, the Department of Highways has been serving as a training school for other industries, and the situation became so acute that drastic action had to be taken. Accordingly, a survey was made of conditions, an outline prepared of the steps needed to bring salaries more in line with those in other organizations, and the plan presented to the Governor and Legislature. By a series of raises, salaries in Virginia have now been considerably improved.

Such action is essential throughout the country, Mr. Ellison said, if we are to have enough engineers to carry on our highway program. Highway work has become much more complex and expensive, he pointed out, and the need for good engineers is therefore greater than ever. At today's costs, no highway department can afford the expensive mistakes likely to be made by green incompetent men. In the long run, good and well paid engineers are the least expensive.

And finally, Mr. Ellison said, we must face the fact that most highway engineers in the top jobs have been there for some time and will soon reach the retirement age. In Virginia, for example, the average age of the top 33 engineers is 56, and of the top 111 men, 52 years. We must therefore redouble our efforts to recruit good young engineers in order to replace the older ones.

#### Contribution of Consultants

How consulting engineers can help highway departments was the subject of a discussion by Dr. D. B. Steinman, consulting engineer of New York City. The use of consulting engineers and their organizations in no way implies technical inadequacy in a highway department, Dr. Steinman said; rather, consulting firms may be used to supplement the highway department staff.

1. They provide a reservoir of trained engineers who are available in times of emergency and excessive work. A highway department can call on them without enlarging beyond its proper size for normal operation.

2. They provide specialized knowledge and skill in dealing with special problems, such as movable bridges, difficult foundations, etc.

3. They offer wide experience gath-

ered from extensive practice, frequently in a much larger area than that with which highway-department engineers may be familiar.

4. They can provide relief for overburdened department heads and administrators by handling engineering and inspection details of special projects.

5. They provide new ideas and viewpoints, as the consultant is an engineer in a position to make new creative contributions to his profession, Dr. Steinman said.

#### Arterial-Route Planning

Planning urban arterial routes should take into consideration not only the relief of traffic congestion but the social and economic development of the community as well, Bertram D. Tallamy, Chief Engineer, New York State Department of Public Works, told the highway officials.

And plans for these routes must rest on accurate information. Such information may be secured by origin and destination surveys, field surveys, studies

of traffic time and delay, studies of traffic flow at intersections, plus factual surveys of the city itself—its population, industries, growth, and development. In addition, plans must anticipate future development and traffic needs.

We can no longer proceed piecemeal in our planning, Mr. Tallamy said, for we now can see that this is both inefficient and expensive. A master plan

should be prepared; then projects can be selected for construction as urgency and funds indicate.

To meet the great challenge to make our cities and states better places in which to work and live, the highway engineer must produce plans for projects which the public may not even know it needs. For this he must have determination and faith in himself. He

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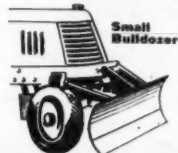
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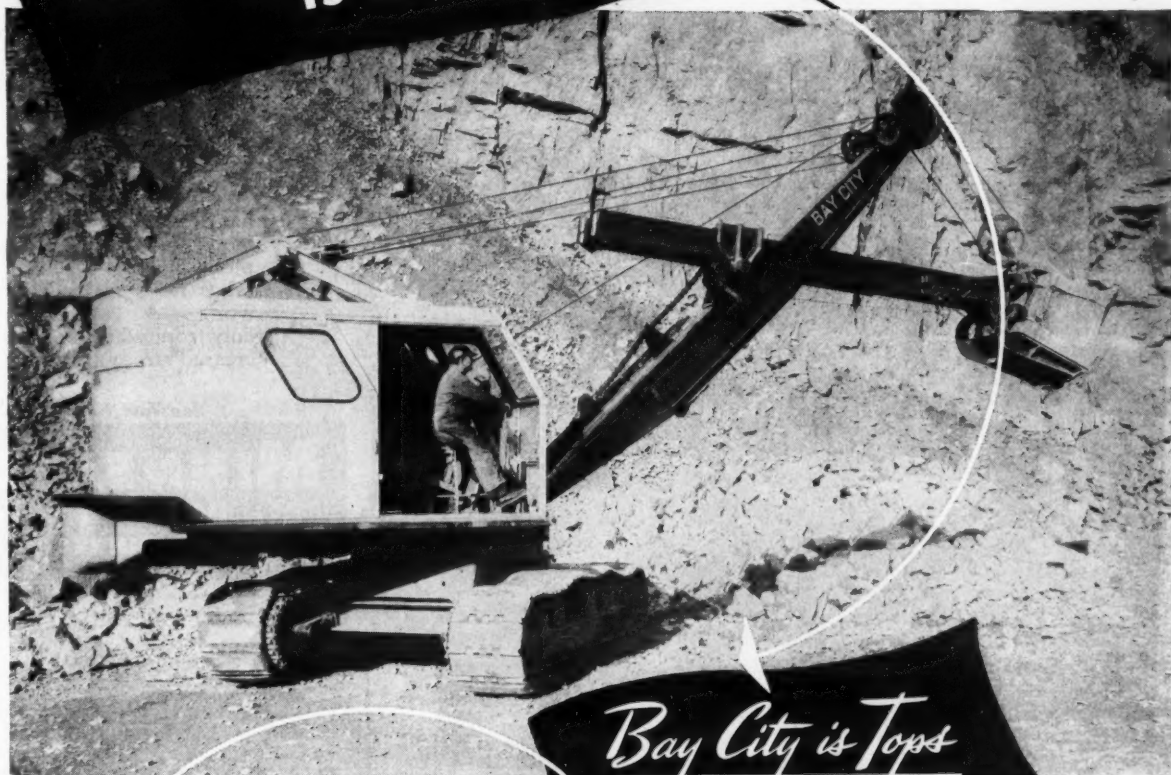
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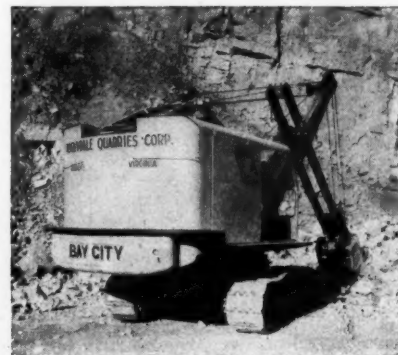
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## Highway Officials Hold 24th Meeting

(Continued from preceding page)

must be able to forge the varying interests of local groups into a harmonious whole, working for the broad overall objectives. And, he concluded, he must have constructive imagination along with sound practical knowledge.

### Bridge Engineering

Developments in bridge engineering were discussed by E. W. Wendell, New York State's Deputy Chief Engineer in charge of bridges and grade crossings. The advancement in bridge engineering, he said, has resulted from the slow accumulation of small details learned over the years. Forty years ago, building a bridge was a local community affair. Today, for the most part, highway bridges have become the responsibility of the state, and highway and bridge construction has become big business. As an example, Mr. Wendell pointed

out that since 1946 New York has contracted for approximately 5,000 bridges and more than 500 grade-separation structures.

A bridge engineer's first consideration must be the foundations, Mr. Wendell said. A realistic approach to bridge building requires a thorough knowledge of foundation conditions. And not until a knowledge of these conditions has been secured, and the foundation design determined, should the type of superstructure be selected. Investigate foundation conditions thoroughly, analyze them, and design accordingly, Mr. Wendell advised. In this connection, he described New York State's development of satisfactory methods and equipment for wash borings. Though soils engineers may frown upon wash borings, he said, years of experience and thousands of borings analyses have produced a method by which they have proved both economical and satisfactory for the desired purpose.

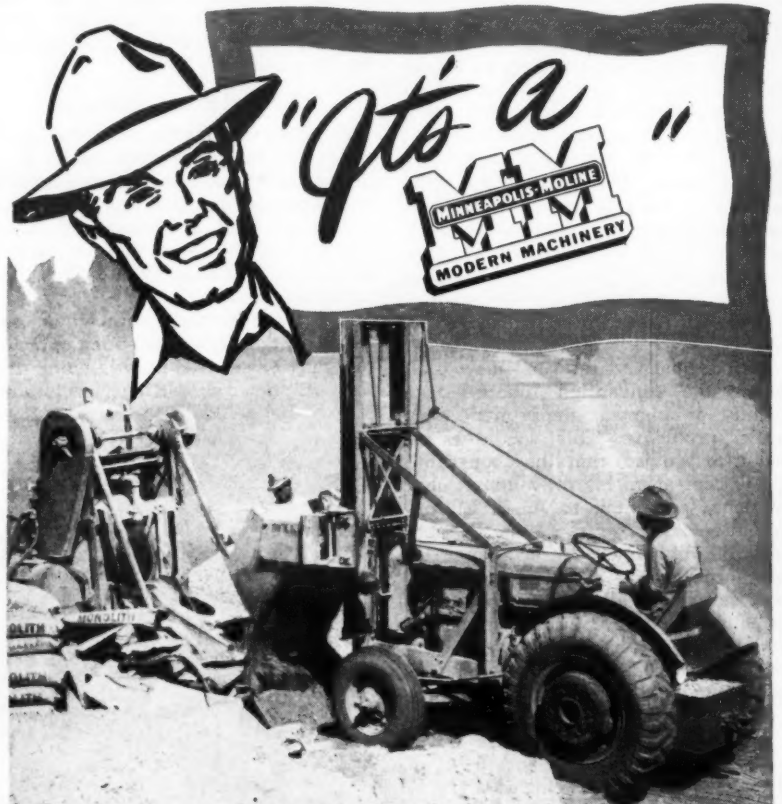
He also discussed the use of welding in bridge construction. Mr. Wendell

believes that instead of condemning welding in general for specific failures, the causes should be investigated in order to correct them. Welded structures are strong and usually less expensive, he said; however, welded structures should be designed as such. In general, he does not favor welding for

the repair of riveted structures.

The use of composite structures has not yet been recognized to the extent it deserves, he said. This type of structure, where steel takes the dead load and the steel and concrete in the girders take the live load, has many applications.

(Continued on next page)



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tions, he believes.

### Contractor Relationships

In the old days, Charles M. Upham, Engineer-Director of the American Road Builders' Association, said, the relationship between contractors and engineers was a contest. Today; they have learned to work together and have a new respect for each other.

Contracting has become a highly complex, specialized, and scientific business, he said. It requires the same engineering knowledge as the administration of a highway department. In fact, he added, many contractors are employing former highway-department engineers. This practice, while it means a loss to the highway departments, is helpful to contractors.

Mr. Upham urged that highway engineers become more familiar with modern equipment and its uses, and with new methods of construction, so that full advantage may be taken of their efficiency and economies.

The need for highways has never been greater, he said. Meeting that need depends on the fullest possible cooperation by contractors, highway engineers, manufacturers, and dealers—to keep costs down and advance the road program.

Mr. Upham concluded by reminding his listeners of the ARBA Road Show in Chicago next July. He predicted that much new equipment will be displayed there, and urged highway engineers and officials to take advantage of this opportunity to learn more about modern road-building machines.

### Equipment Trends

The latest trends in equipment was the subject of a paper by William S. Ziegler, Sales Manager, Caterpillar Tractor Co. The current trend, Mr. Ziegler said, is to build more quality and workability into machines, with a steady succession of improvements rather than radical changes in design.

In the power-shovel field, for example, future improvements will include lighter materials, greater power, and more operator comfort, for increased productivity. Trucks and dirt-moving wagons will have higher speeds and greater capacities. Aggregate-production equipment will show no radical changes. But new alloys will make possible lighter weights. Lubrication will be improved. Straight-line units will be made more portable. The same trend may be found in hot-mix plants.

Considerable experimental work is being done in the soils-compaction field. Already a very heavy rubber-tire roller is in use, and announcement of a number of vibratory compactors of various types may be expected in the near future. As for tractors, speeds and weights will remain about the same. Mr. Ziegler believes that four-wheel rubber-tired units will dominate the long hauls, but that there is a place for both rubber-tired and track-type tractors. There are no basic changes in dirt-moving scrapers, he said, and the

3 to 30-yard models remain the most economical and useful sizes.

Research by manufacturers is essential to new developments and improvements, and plays an important role in the manufacturers' aim to reduce costs, Ziegler said.

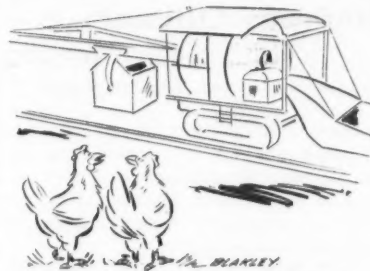
### Panel Discussion

A Highway Information Please on the general question "What Can We Do to Provide Better Highway Service?" was the feature of the fourth session. Robert M. Reindollar, Chairman of the Maryland State Roads Commission, was moderator. The panel consisted of Dwight W. Winkelman, President of D. W. Winkelman Co., Inc., and President of the Associated General Contractors of America, representing contractors; C. H. Buckius, Assistant Chief Engineer of the Pennsylvania Department of Highways, representing highway engineers; Henry M. Hale, Milton Hale Machinery Co., for the Associated Equipment Distributors; Bernard E. Gray, General Manager of The As-

phalt Institute, as representative of the bituminous industry; M. J. McMillan, Manager of the Eastern Offices, Portland Cement Association, speaking for the cement industry; and Burton W. Marsh, Director of the Traffic Engineering and Safety Department, American Automobile Association.

Highway contracting organizations are a public asset, Mr. Winkelman said, but we can maintain that asset only if there is a road-building program on a continuing basis. With the certainty of such a program, contractors can afford the increased mechanization necessary for efficient and economical operation.

Contracting firms took longer than expected to get ready for the post-war road program, he said, and much of the increase in highway costs has been due to the slow and expensive process of reestablishing efficient well equipped organizations. In Mr. Winkelman's opinion, highway contractors have pretty well completed this task of rebuilding their organizations, and are now



"They say it lays pavements!"

geared to the current road program. As a result, he predicts, costs have reached their peak and will level off or decrease in the future.

As a contribution to lowering highway costs, he urged the development and efficient use of more machines in highway work; modernization of specifications to fit the requirements of machine work; thorough understanding by resident engineers of the full intent of new specifications; more knowledge of

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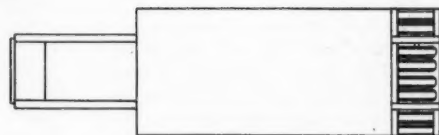
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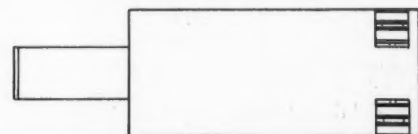
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## Highway Officials Hold 24th Meeting

(Continued from preceding page)

modern machines and job operations by highway engineers; adequate salaries for highway-department personnel; and greater cooperation among contractors, highway engineers, equipment manufacturers, and dealers.

C. H. Buckius pointed out that highway engineers are facing demands by the public for more and better highway service than they are in a position to meet. In his opinion, only such work should be started as is entirely justified for traffic, safety, and economic welfare. The program, he said, must be kept within the ability to pay. Ideal design simply cannot be financed, and the highway engineer's job, as he sees it, becomes one of coordinating the ideal and the practical, in order to build as much mileage as possible of a practical modified design and provide a balanced highway system at reasonable cost.

The equipment distributor, Mr. Hale said, is a connecting link between manufacturer and equipment user. But his contribution to better highway service extends beyond just salesmanship. In addition, he can help the contractor develop new methods and more efficient job layouts; he can provide information on the use, performance, and limitations of new machines; he can help in better shop practices and field technique for equipment maintenance and repair; and perform a useful service in providing parts and attachments.

Every industry has a responsibility to cooperate with the user, Mr. Gray stated, and the petroleum industry is doubly interested in better highway service, since it provides not only materials for building and maintaining highways but the fuel for the cars that travel on them, as well as serving as collector of taxes. As such, the industry is deeply concerned in the best use of highway funds. As an example of industry cooperation, Mr. Gray cited the standardization and simplification of the grades of asphaltic cement and cutbacks, in the interest of efficiency and economy.

Mr. Gray believes that we can make better use of the present values in our roads by such improvements as widening, and the general improvement of several existing roads in a locality instead of planning a "superhighway".

The need for constant training and retraining in better construction practices was stressed by Mr. McMillan. He pointed out that during the war, when the job tempo was stepped up, some careless habits were acquired. These must be corrected, he said, if we are to insure maximum highway service. He suggested that specifications be modernized, construction manuals revised, and steps taken to insure adequate personnel.

In concrete-paving developments, he placed first air-entrained concrete and its resistance to scaling, especially when subjected to ice-control treatment. Other factors contributing to better highway service include adequate sub-base conditions based on soils studies and the necessary correction measures to assure a stable subgrade, slab thickness based on the type of traffic load, the elimination or wider spacing of expansion joints, careful filling of joints, and safety and traffic-control measures such as colored traffic lanes, "singing" traffic stripes, and light-reflecting curbs.

Three things will provide better highway service, said Mr. Marsh of the AAA. They are new highway facilities where needed, more efficient and safe use of existing facilities, and an adequate program of public relations to secure public support for our highway program.

### Modern Road Maintenance

In the absence of A. L. Donnelly,

Connecticut's Director of Roadway Maintenance, due to illness, two members of his department discussed this important phase of highway work.

First of these was C. A. Campbell, who holds the unique position of Construction-Examiner for Maintenance. Mr. Campbell, who serves as liaison officer between construction and maintenance, outlined Connecticut's policy of having all construction plans reviewed by the maintenance bureau before contracts are let. Under this system, any design features which might increase maintenance problems and costs may be detected and changed at the planning stage. As a further step in this plan, the Examiner for Maintenance inspects the project after the work is finished but before it is accepted, to insure minimum maintenance.

Louis Pike, Maintenance Engineer, described Connecticut's maintenance program as preventive and constructive maintenance. Procedure has been made uniform throughout the state, he said, with specialized crews working under trained foremen. Materials used are carefully specified and rigidly controlled. Roadway maintenance is well mechanized, and maintenance costs have been kept at a reasonable figure, he reported.

Resurfacing is the most recent of maintenance's contributions. This type of work protects the original investment in the highway and keeps up the value of the old road, Mr. Pike said. Resurfacing in Connecticut is done by state forces for economy's sake, up to the point where the cost of the work is higher than when done by contract.

### Current Construction Costs

One of the subjects touched upon most often during the meeting was that of current construction costs. During the final session, a paper on this subject was presented by Charles M. Noble, State Highway Engineer of New Jersey. Although highway construction costs have risen 65 to 84 per cent in New Jersey, Mr. Noble pointed out that this increase is not out of line, in com-

parison with general cost-of-living increases. As a matter of fact, it is lower than that of many items, including many contractor costs.

Mr. Noble believes that the old-time independence, individuality, and aggressive competitive spirit of the American contractor is not dead, and that there are favorable signs of a better outlook ahead. But, said Mr. Noble, if construction costs are to be lowered, public officials have a responsibility in providing sufficient work to enable the construction and equipment industries to gear up to the job ahead by building and training organizations disrupted by the war, developing more

efficient methods, and producing more and better machines.

### Roadside Development

The value of a collaborative program wherein landscape engineers are employed to work with engineers of highway design and maintenance for the goal of a "complete highway" was pointed out by Nelson M. Wells, Director of the Landscape Bureau, New York State Department of Public Works. The concern of this Bureau, which was established in 1945, is both broad and general, he said, and also involves many details. Land planning

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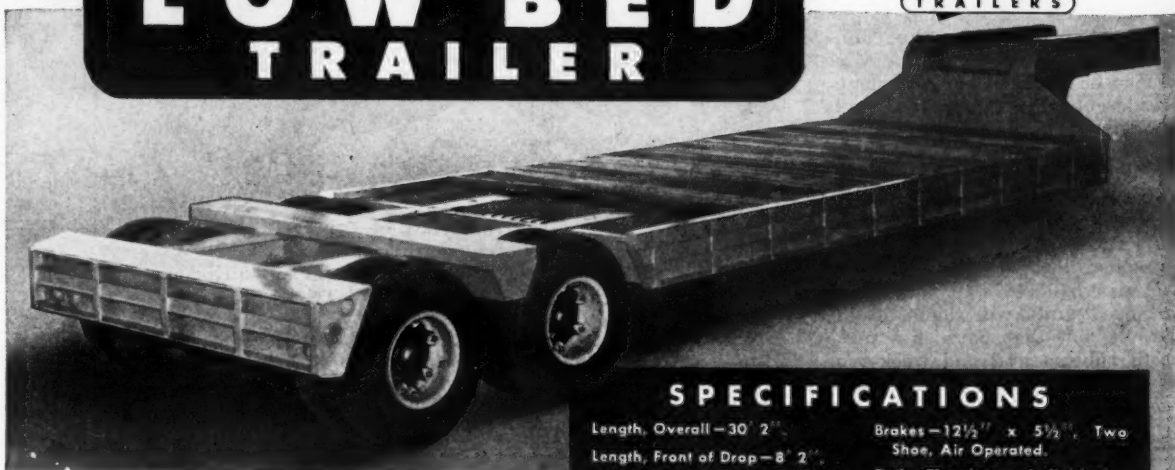
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for human use and enjoyment; adapting a highway to the needs of traffic and adapting its alignment and grade to topography; use and appearance of road shoulders; design and functioning of surface drainageways; modeling of all graded areas; the vegetation along the roadsides; and the outdoor advertising program—all these come within the scope of the Bureau's functions.

Features of New York State's program of roadside development include soil-erosion control; salvaging all topsoil and stockpiling it for future use, to save valuable fertile farm land; streamlining the contract specifications for roadside items; development of mechanically stabilized turf shoulders; special crews for the care of roadside trees; a survey of advertising signs and the establishment of a voluntary agreement with outdoor advertisers.

#### Resolutions

Several resolutions were presented to the convention by Spencer Miller, Chairman of the Resolutions Commit-

tee. The first of these advocated a maximum axle loading of all vehicles not to exceed 18,000 pounds, as a measure to preserve our highway transportation facilities.

The second resolution recommended that the Public Roads Administration undertake a study of the actual cost of improving the various highway systems in each of the states, so that funds appropriated by Congress may be commensurate with the costs required to develop the highways to adequate standards.

The convention recorded its sense of responsibility in the matter of highway safety, and recommended the appropriation of sufficient funds to design and construct the safest possible types of highways. Members of the association also passed a resolution in approval of a program of continued Federal Aid.

#### New Officers

W. J. Childs, Jr., Chief Engineer of the Maryland State Roads Commission, was elected President for the coming

year, with John C. Burnham, Administrative Assistant, Maine State Highway Commission, as Vice President. A. Lee Grover, Secretary of the New Jersey State Highway Department, was again re-elected Secretary and Treasurer.

The Board of Directors are Lucius D. Barrows of Maine, F. E. Everett of New Hampshire, H. E. Sargent of Vermont, William H. Buracker of Massachusetts, George H. Henderson of Rhode

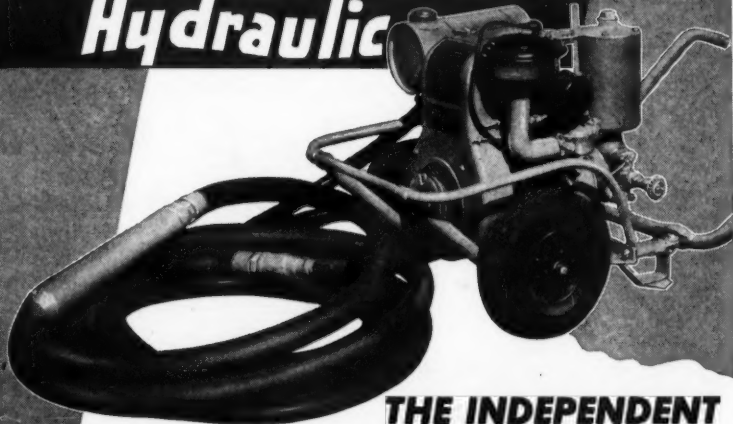
Island, G. A. Hill of Connecticut, H. O. Schermerhorn and R. B. Traver of New York, Spencer Miller and A. Lee Grover of New Jersey, Ray F. Smock of Pennsylvania, W. A. McWilliams of Delaware, R. M. Reindollar of Maryland, and J. N. Robertson, District of Columbia.

The Board voted to hold the 1949 convention of the Association in Boston, Mass.

Not just because it reduces the pull on steering levers to five pounds, or even less, but because it reduces wear on clutches, throwout bearings and brakes. Silver Steering Boosters pay their cost many times over in many ways. Any tractor dealer will install one on trial, ON APPROVAL, in less than thirty minutes. Ask your dealer to demonstrate a Silver Booster and you will never operate a tractor without one.

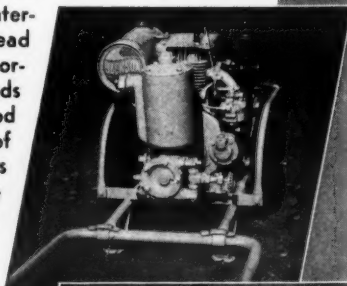
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1406 SOUTH GRAND AVENUE  
LOS ANGELES 15, CALIFORNIA Richmond 4191

## The JACKSON Hydraulic



### THE INDEPENDENT CONCRETE VIBRATORY UNIT Contractors SWEAR BY (Never at)!

For downright reliability and trouble-free service, as well as the ability to do a perfect job of vibrating concrete on a wide range of construction, the JACKSON HYDRAULIC is tops. There are no troublesome parts to break, and as all moving parts run in oil there is no lubrication problem. Amplitude and frequency, the factors so important to proper vibration of concrete, have been correctly balanced with careful regard to the diameter of the vibrator head. Frequency is adjustable from 4000 to 7000 V.P.M. through throttle of the highly dependable 5 H.P. Wisconsin engine. 34 ft. flexible handle gives a satisfactory operating range for all jobs. Wheelbarrow mounting makes the entire assembly easily portable. An interchangeable grinding and drilling head is available and easily attached. Thoroughly proved in the hands of thousands of contractors, this machine has stood the test of time and represents one of the very best equipment investments any general contractor can make. Write for the complete facts or see your JACKSON distributor.



**FOR EACH AND EVERY TYPE OF CONCRETE CONSTRUCTION** the JACKSON line contains a vibrator that will give you the best possible job at the minimum of labor and maintenance cost — electric, engine-driven flexible shaft and Hydraulic models; internal and external types. Drop us a line for the best solution to any vibrating problem.

**ELECTRIC TAMPER & EQUIPMENT CO.**  
LUDINGTON MICHIGAN

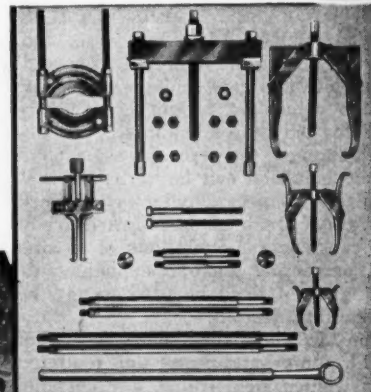
DEPENDABLE heavy duty tools for pulling and installing bearings, gears, sleeves, wheels, shafts and other close-fitting parts. Made of high alloy, drop forged, heat-treated steels, precision machined—strong, easy to handle, portable, SAFE to use, FAST-working! Approved by Hyatt, M-R-C, New Departure, SKF, Timken, and by Tractor Manufacturers.

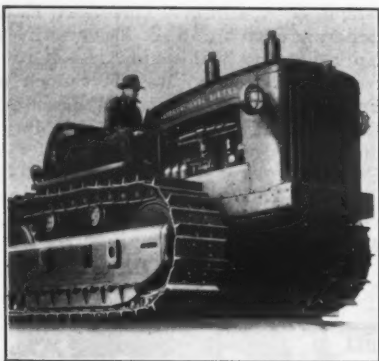
OTC PULLERS and Attachments, BOX WRENCHES and other tools in sizes to handle practically every maintenance job.

**FACTORY APPROVED CATERPILLAR SET**  
Essential service equipment for all CATERPILLAR Tractors; also used on other tractors and on road machinery. Other sets available to meet your needs.

Write for OTC Maintenance Bulletin showing many time-saving OTC uses.

**OWATONNA TOOL CO.**  
348 Cedar St., Owatonna, Minn.





The new International TD-24 crawler tractor has 180 hp at the flywheel, 167 at the driving end of the belt, and 140 at the drawbar. It is powered by a new International 6-cylinder 4-cycle engine, and has a speed range from 1.6 to 7.8 mph.

### New 180-Hp Tractor Has 18½-Ton Weight

A new 18½-ton crawler tractor has been announced by the Industrial Power Division of the International Harvester Co., 180 No. Michigan Ave., Chicago 1, Ill. The TD-24 is listed at 180 hp at the flywheel, 167 hp at the driving end of the belt from the power take-off, and 140 hp at the drawbar. It weighs 36,275 pounds not including fuel, water, attachments, or dunnage; and 37,178 pounds with fuel tank and radiator filled.

The tractor is powered by an International Harvester 6-cylinder 4-cycle engine. It has eight speeds forward and eight in reverse. Speed range is from 1.6 to 7.8 mph. It has a synchromesh transmission.

Among the features claimed for the TD-24 are: push-button starting with the International in-built gasoline conversion starting system; hydraulically boosted engine clutch control; planet-power steering under finger-tip control with a hydraulic system, which permits gradual turns with both tracks pulling, or pivot turns with one track locked and the other track under full power.

The track-frame assembly has taper roller bearings in the track rollers and front idlers; a new type of idler recoil spring; and a one-piece welded track frame. A needle-bearing universal joint is said to compensate for misalignment and to permit heavy equipment to be mounted on front of the tractor. Equipment available for use with this tractor includes angle-blade dozers, bulldozers, land-clearing blades, power-control units, pusherplates, scrapers, rippers, canopies, etc.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 3.

### Asphalt Emulsifiers Made in Many Models

Machinery and equipment for setting up asphalt-emulsifying plants is available for purchase or lease from K. E. McConnaughay, West Lafayette, Ind. Emulsifying on the job provides several economies and conveniences, according to the company: freight charges are paid for only the actual weight of asphalt shipped; the percentage of asphalt in the emulsion can be varied as it is emulsified to meet actual job conditions; the rate of break can be adjusted to suit the construction operations of mixing and compacting; and only enough emulsifying agent need be used to get the workability desired.

The McConnaughay plants consist of a mill, pumps, and power unit mounted on a welded steel frame. For portable use, two water tanks, the water softener, and the emulsifier can be mounted on a trailer or truck bed which is 16 feet long and 7 feet 6 inches wide. The height of the unit above the truck frame can be as low as five feet, to permit direct operation from a tank car of asphalt. Or the same units can be

mounted on solid foundations for permanent installations.

Heart of the unit is the emulsifier or mill. McConnaughay makes these mills in a wide range of sizes to meet varied construction needs. The Model No. 18 is said to have a capacity of 5,000 gph. It is recommended by the company for portable or stationary use. It has twin, individually clutched proportioning pumps with a capacity of 90 gpm. Insert-type thermometers and wells are installed to control the temperatures. The power plant can be a gasoline engine which develops 75 hp at 1,800 rpm, or a diesel engine or electric motor which develops 60 hp at 1,800 rpm.

The Model No. A-12 is a smaller mill rated at up to 4,000 gallons of emulsified asphalt per hour. Construction features are the same as those for the Model No. 18, except that the pumps have a capacity of 80 gpm. The power plant required is a gasoline engine giving 60 hp, or a diesel engine or electric motor giving 50 hp. The Model No. A-14 is like the A-12 in all respects except that its maximum capacity is 3,000 gph. Power requirements are dropped to 50 and 40 hp.

The Model No. C-12 is designed for portable use. It is like the larger models, but its mechanical action is so geared and its capacity so reduced as to permit the entire plant to operate from a 22-hp gasoline engine, or an 18-hp diesel engine or electric motor.

K. E. McConnaughay supplies technical service to aid the users of this equipment. The company will furnish engineers, trained operators, instruction manuals, laboratory service, etc. Other bituminous equipment the company manufactures includes portable asphalt barrel heaters, asphalt heating tanks, multi-pug asphalt mixers, and mix-spread asphalt pavers.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 10.

### Data on Boiler-Feed Pumps

A line of multi-stage centrifugal pumps, designed for pumping hot water and for installations which require high water pressures, is announced by Jacuzzi Bros., Inc., Richmond, Calif. A catalog describing this line of boiler-feed vertical-design pumps can be obtained from the company.

It contains general information on the line and presents specific information on the standard units which vary in

size from ½ to 20 hp. Custom-built units can also be provided to meet specific requirements. Data are included for selecting the proper size of pump for any specific jobs. The folder also contains performance and data tables. Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 83.

### Midwest Agent for Clyde

A. H. Scharff, Jr., is the new factory representative in the midwestern district for Clyde Iron Works, Inc., Duluth manufacturer of hoists, derricks, etc. He will be located in the company's new offices in the Railway Exchange Bldg., 224 So. Michigan Ave., Chicago.

## Loads 3 to 5 Y.P.M.\*

Soon Pays for Itself in  
Time and Money Saved!

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Yards Per Minute

Send for Bulletin CE-12-847

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PULVERIZERS • CONVEYORS • LOADERS

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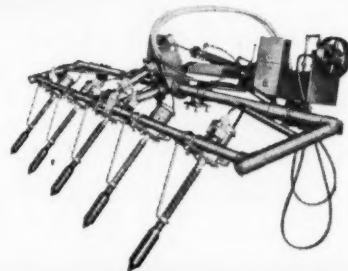
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ORIGINATORS OF INTERNAL CONCRETE VIBRATION

724 S. Flower Street, Burbank, California

# Urban Routes Planned For Cities in Virginia

## Progress in Solution of City Traffic Congestion Lies in Arterial Highways; Part of 20-Year Plan

By J. A. ANDERSON, Commissioner,  
Virginia Department of Highways

ALTHOUGH the completion of our rural highway system is not in sight, and probably never will be, the revenues accruing from the rapid development of the motor vehicle have provided a national network of rural highways unequaled in the world.

Traveling through the rural-highway mud of the early twenties, the motorist was much relieved to reach the cities' wide and smooth paved streets where he could travel in comfort and enjoy his motor machine to the fullest. Now the rural mud has been virtually conquered. But today, driving along city streets, the exasperated motorist encounters another kind of mud—the mud of congestion—as he looks, often vainly, for a hole through which he can squeeze his car.

Every hour of daylight hundreds of thousands of anxious motorists creep along busy city streets, losing time and money. Traffic counts made in the city of Richmond, Va., for example, indicated that traffic increased 59 per cent from 1945 to 1947, but delay caused by congestion increased 104 per cent during the same period. Economic losses to the motorist, the merchant, and the city are incalculable. But estimates made by consulting engineers who prepared the Richmond Expressway report placed such losses at \$2,250,000 annually for the City of Richmond. With this as a yardstick, the economic losses from traffic congestion in Virginia approach \$10,000,000 annually.

But the worst is yet to come. Motor-vehicle registrations in Virginia in 1946 were 12½ per cent greater than those registered in 1945, but 1946 rural traffic was 43 per cent higher than 1945. Motor-vehicle dealers in Virginia are holding orders for 60,000 new cars that will augment the 500,000 now in use but replace few of the older models. The "jalopy" will remain to add to the congestion, in its inimitable way, until supply exceeds demand and prices descend to a level that can be reached by all.

### By-Passes Not the Solution

In the early thirties, hasty action on the part of some states to crack the city bottleneck with by-passes resulted in long stretches of costly highways which offered little or no relief to urban congestion. The Public Roads Administration reports that 65 per cent of all traffic entering and leaving cities with a population of 2,500 to 10,000 has origin or destination in those cities. Non-by-passable traffic ranges up to 90 per cent in cities of 300,000 to 500,000. In the case of Virginia's largest city, Richmond, 83 per cent of the traffic would not use a by-pass if one were available.

Virginia is confronted, as are many other states, with three clearly defined problems, each of which is no less important than the other: (1) the modernization of an obsolete primary system, (2) the improvement of the feeder roads, the secondary system, and (3) the too-long-neglected urban extensions.

### Virginia's 20-Year Plan

In meeting these problems, there has always been the closest cooperation between the Highway Department and Virginia's municipalities. In 1942, with

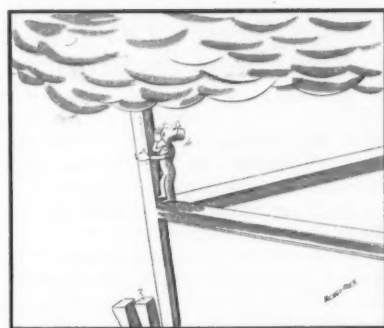
characteristic foresight, the Virginia General Assembly enacted legislation closely following the suggested model; it authorized the Highway Commission to designate, construct, maintain, and improve limited-access highways.

Contemplating the problems that would beset the State and Virginia's municipalities at the end of the war, the 1944 General Assembly directed the Department to prepare a 20-year flexible plan for the development, improvement, maintenance, and replacement of the primary and secondary systems of highways, including such parts as pass through the cities and towns. Further,

the act stipulated that plans affecting municipalities be prepared in close harmony with local authorities. It also directed the Department to study the need for limited-access highways, belt-line distribution roads, by-passes, and other forms of modernization. The plan, completed in October, 1945, has received widespread approval.

Virginia's Traffic and Planning Division, under the leadership of Burton Marye, Jr., has not only made valuable contributions to arterial-highway planning; it has gained the complete confidence of urban authorities in all parts of the state. That Virginia's Highway Commission is wholeheartedly behind the plans for the improvement of urban traffic conditions is evidenced by these paragraphs from the "Twenty Year Plan":

"In view of the now recognized importance of urban highways to inter-



"Hey, Joe... JOE?"

state and intrastate travel, the Commission feels it not only just but essential to the efficiency of the state's overall transportation system that adequate legislation be enacted at the next session of the General Assembly, em-

(Continued on next page)

**JAEGER announces the hoist with automotive transmission, hydraulic finger-tip control**

# 2-SPEED HYDRO-HOIST

**2-SPEED FLEXIBILITY:** The shift of a lever gives you low-gear power or high-gear line speed—both in the same hoist.

**HYDRAULIC FINGER-TIP CONTROL:** The "feel" but not the weight of the load. Like \$25,000 cranes.

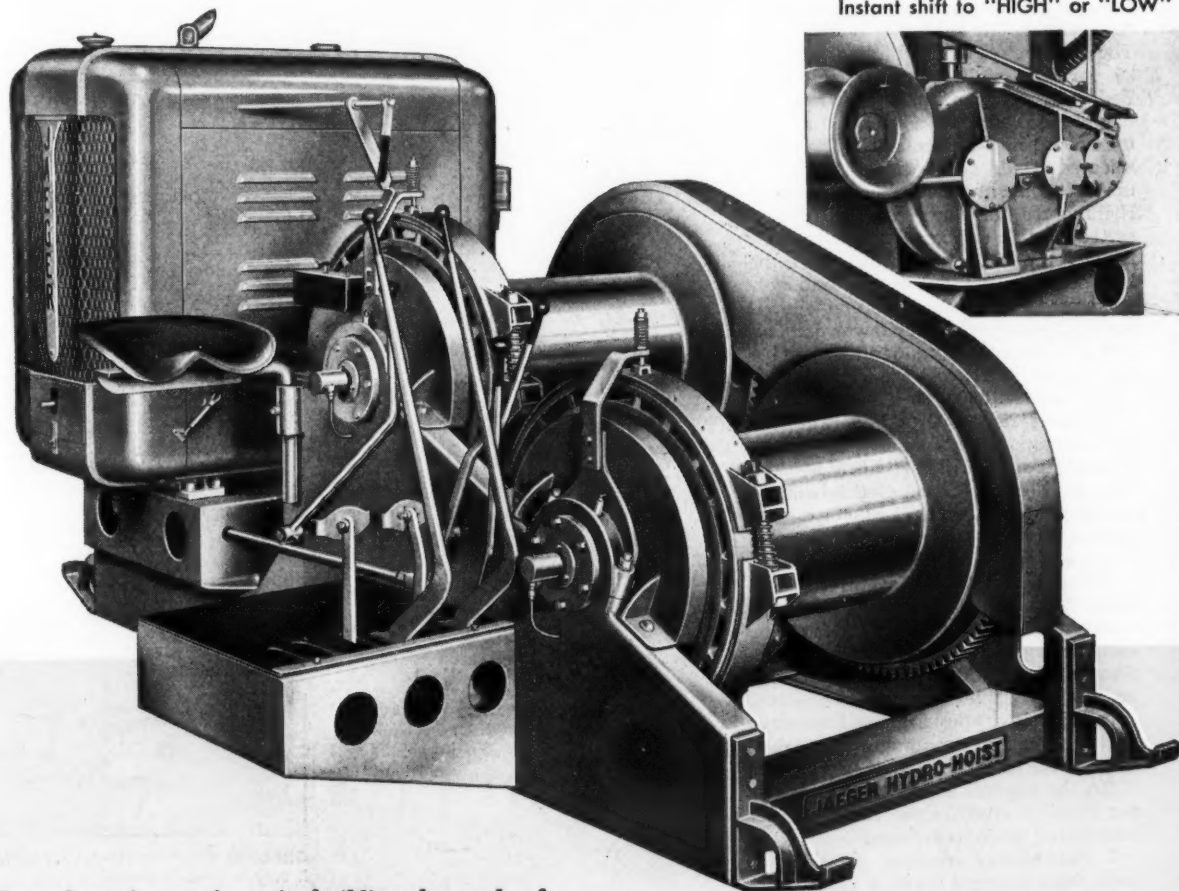
**ALL-STEEL, PRECISION FABRICATED:** No more broken side frames or drum flanges. Rigid, strong, yet lighter in weight.

**AUTOMOTIVE TRANSMISSION:** Use gas or electric power interchangeably at 1800 rpm. Quick change-over. Economical, efficient.

**25 TO 40 HP "UTILITY" HOISTS:** Single or double drum; gas or electric power.

**60 TO 100 HP "ERECTOR" HOISTS:** 1, 2 or 3 drums. Easy to add third drum to 2-drum hoist in the field. Gas, electric or diesel. Anti-friction bearings. Hydraulic-controlled boom swinger if desired.

Instant shift to "HIGH" or "LOW"



From Jaeger's experience in building thousands of hoists comes this revolutionary machine to speed your work, cut costs, often save buying a second hoist.

Merely shift the lever on the 2-speed transmission to select tremendous "low gear" line pull for the heaviest hoisting operation, or to select "high gear" line speed for the fast handling of lighter loads.

Merely touch the hydraulic levers to feel and control all hoisting operations—handle loads quickly, easily, accurately, safely. The same type controls have been used

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Change from gasoline to electric power merely by coupling standard squirrel cage motor direct to transmission with flexible coupling and adapter bracket.

In every feature of construction, Jaeger 2-Speed Hydro-Hoists are years ahead of the field. See your Jaeger distributor or send today for Catalog H-8.

**THE JAEGER MACHINE CO., Columbus 16, Ohio**

REGIONAL OFFICES: 1504 Widener Bldg., Philadelphia 7, Pa.; 226 N. La Salle St., Chicago 1, Ill.; 235 American Life Bldg., Birmingham 1, Ala.

## Urban Routes Planned For Cities in Virginia

(Continued from preceding page)

powering the Commission to aid the cities by sharing in the cost of urban extensions of the highway system."

(Such legislation was enacted by the 1946 General Assembly.)

"As payments to cities and towns are made from funds available for expenditure on the primary system, the increased aid for urban construction and maintenance would retard primary construction in rural areas and prolong the time period required for bringing those highways to adequate standards. The Commission believes that the delay in bringing the rural primary system to adequate standards would be more than offset by the increased efficiency in overall state-wide transportation brought about by the improvement of urban highways."

Obviously, the intolerable traffic conditions confronting the larger American cities can be relieved only through arterial street systems and limited-access expressways. But funds available for these expensive facilities are also limited.

### The Plan for Richmond

In Richmond, a city of 250,000, a comprehensive origin-and-destination survey was made by the Department of Highways in cooperation with the Public Roads Administration. Its purpose was to secure factual traffic data for the location of an expressway system to serve the city and its connecting highways and to form a part of the high-standard inter-regional network.

After two years of extensive engineering, economic, and traffic studies, the consulting engineers submitted their report. Richmond was fortunate. The expressway could be had for only 25 per cent of its cost, the State and Federal government to pay the remaining 75 per cent. It was pointed out by the consulting engineers that the route selected would serve the greatest volume of traffic at the least cost, and that Richmond's development was ideally suited to such an expressway route. Of the seven possible schemes studied, the line selected would traverse undeveloped properties, except in mid-city. It would displace relatively fewer persons, and would separate residential from industrial areas. Its cost was estimated to approximate \$1,000,000 a mile.

Of the \$125,000,000 of Federal funds per year apportioned among the states, Virginia's share is less than \$1,500,000. The \$1,500,000 is distributed among 29 municipalities in Virginia having a population of 5,000 or more. Richmond's share is slightly more than \$295,000 for one year and \$886,000 for three years. With City and State supplying the matching funds, less than 2 miles of the expressway can be built in three years. Slow progress, but a beginning to the end of city "mud"—traffic congestion.

In their report on "Express Highways in the Richmond-Petersburg District" in 1946, the consulting engineers wrote:

"In the general selection of locations for detailed study, some of the points considered were as follows:

1. Expressway routing should not materially increase distance to be traveled.
2. Right-of-way should be placed where cost of the project will be reasonable, considering cost both of right-of-way and of construction.
3. Location should extend in close proximity to large centers of vehicle origin and destination, to furnish best service to users and to remove maximum amount of traffic from surface streets.
4. Location should assist and not interfere with future industrial development.
5. Other factors being approximately equal, a position of the expressway to

serve as a buffer between zoning districts is preferable.

6. Wherever possible, a new right-of-way in built-up districts should extend through obsolescent areas and areas of non-conformance to zoning.

7. Suitable interchange facilities must be possible with either planned or existing city streets.

8. Plan should be flexible to permit future additions when required.

9. Suitability of location for construction by usable sections is an important consideration.

10. Wherever possible, the express road should be located and scheduled for use by both through and local traf-

fic; such joint usage results in overall economy as the more heavily traveled roads cost less per unit of travel."

Study plans and profiles and estimates of cost, as well as economic analyses of costs and benefits, were made for each of seven alternate routes.

### Situation a Challenge

Traffic congestion in Virginia cities, like all American cities, is present and will stay until bold measures are taken to correct the conditions responsible for the inundation of our antiquated streets by the motor vehicle.

The Virginia Department of Highways has loaned and will continue to

lend trained personnel to Virginia municipalities to aid them in the solution of their traffic problems. Traffic surveys, including parking studies, have been completed in four of Virginia's twenty-four cities, and requests for surveys have been received from two others. The cities have contributed to such studies but the costs have been relatively small.

Under present law the State contributes to each municipality of more than 3,500 population \$4,000 a year for each mile of primary highway within its limits. In addition, the law also permits the State to match municipal funds,

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highway construction  
and maintenance jobs  
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GRADING BETWEEN FORMS... All-Wheel Steer makes it easy to grade in reverse.

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dollar for dollar, for the improvement of urban extensions of the primary system. Assuming a continuance of urban Federal Aid in reasonable amounts, the municipalities may receive, including matching funds, \$34,000,000 in twenty years. Of course, all improvements will not cost \$1,000,000 a mile, but when the 270 miles of urban extensions are considered, the available money is thinly spread. Minimum urban needs in Virginia are estimated in excess of \$80,000,000.

Because of the cost of extensive highway improvements within urban places, it is obvious that physical improvement cannot, indeed should not, be relied

upon to do the entire job. This is particularly true of smaller places of limited financial ability. The American motorist is in for much more regulation with regard both to his movement and his parking. He will not relish this, but it is obvious to every student of urban traffic that if traffic congestion is to be licked, much better use than is the case at present will have to be made of the streets that now exist. No-parking one-way streets etc. will work wonders.

#### Public Education Needed

Because the average American detests regulation of any description, an

enormous educational job confronts the highway and traffic engineers and the urban planners. This educational job is made no easier by minority pressure groups with special interests. Nevertheless it is mandatory that the people at large be educated—that they be informed of the full consequences of urban traffic congestion and the necessity of certain distasteful regulations and, in many cases, the necessity for the expenditure of large sums of money.

We who reside in the older parts of the nation have a particularly difficult job. The longer persons or families have been rooted in one place the greater is the resistance to change. They don't or

won't understand the reason for any changes, physical or regulatory.

The pressing need for a continuous educational program has resulted in the addition of a subdivision in the Virginia Department of Highways. This subdivision devotes its entire time to presenting to the public facts and figures in layman's language.

Only a bare start has been made in Virginia in meeting and handling the urban traffic problem. But we believe the methods started—(1) monetary assistance to the cities in effecting physical improvements; (2) engineering and economic advisory assistance in traffic studies; and (3) an educational program—are steps in the right direction.

#### Leadership Required

Every element of leadership will be required to solve the urban highway problem. It will take the diplomacy of a statesman, the wisdom of a philosopher, no less than the optimism of an engineer, to crystallize and form and direct public opinion on the problem. Moreover, these elements of leadership will have to be applied with all the enthusiasm of youth.

The young men of World War II, now back with us or preparing themselves in schools and colleges to take their places among us, are well acquainted with doing the impossible. We shall look to them for enthusiastic leadership in securing better urban highways. Let us go forward.

A paper presented at the 33rd Annual Convention of the American Association of State Highway Officials.

#### Structure-Design Text Brought Up to Date

The second edition of "Stress Analysis and Design of Elementary Structures" has been published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. The book was written by James H. Cissel, Professor of Structural Engineering at the University of Michigan. It covers the principles of structural analysis and design of timber, steel, and concrete structures.

The material in the second edition has been rearranged to give current code requirements for floor loads in buildings; a more complete discussion of roof loads; and current live-load requirements for highway and railroad bridges. One chapter has been rewritten in order to incorporate the most recent changes in specifications of the American Iron & Steel Institute, the American Association of State Highway Officials, and the American Railway Engineering Association. The chapter on reinforced concrete has also been reworked to bring the material into line with present-day recommendations of the American Concrete Institute. A new chapter has been included on the design of light-gage steel members.

In this book Professor Cissel discusses external forces, graphic statics, reactions, shear and bending moment, restrained and continuous beams, trusses, stability, structural fastenings and connections, beams and columns, and other phases of the subject. Illustrative examples are given of the solution of typical problems. Price: \$5.00.

#### It's Not Drink, Your Honor

Joseph A. Passineau, 50, a heavy-equipment operator of West Springfield, Mass., was freed from charges of drunkenness and drunken driving when a Superior Court jury accepted his contention that he walked with an "occupational sway" rather than a "drunken stagger".

Police had charged that Passineau's gait was unsteady after an automobile accident last September. But the defendant's attorney said that 21 years of driving heavy bulldozer-tractors had left Passineau with a tendency to sway for several hours after work each day.

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The Power Grader That Has Everything!

✓ All-Wheel Drive

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AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.





The Malsbary high-pressure combination steam cleaner is being used here to remove road oil, mud, clay, and asphalt from a tractor loader.

## Cleaning Equipment Has Several Speeds

New cleaning equipment especially designed for use with heavy-duty construction machinery is made by the Malsbary Mfg. Co., 845 92nd Ave., Oakland 3, Calif. This high-pressure combination cleaner is designed to apply large volumes of cleaning solution or water at pressures of from 0 to 400 psi, and at temperatures ranging up to 325 degrees F.

According to the manufacturer, this machine can be used for five different combinations of heat and pressure: (1) high-pressure steam cleaning at pressures up to 200 psi; (2) high-pressure cold-water cleaning; (3) hot-water cleaning at pressures up to 400 psi and capacities of from 15 to 30 gpm; (4) low-pressure warm-water cleaning at speeds of up to 30 gpm; and (5) straight steam at 15 to 30-hp volumes. The company recommends the first combination for removing heavy grease, tar, and asphalt, exterior building cleaning, maintenance, etc.; the second for oils, greases, and for de-icing; the third for removing caked mud, dirt, clay, etc.; the fourth for washing by hand; and the last for cleaning asphalt tanks, sterilizing, etc.

The Malsbary unit is not subject to boiler code, and requires no annual inspection or licensed operator.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 13.

## Hydraulic Power Unit

A small-size hydraulic power unit has been developed by the Hydro-Power Division of The Hydraulic Press Mfg. Co., Belmont and Sheridan Aves., Springfield, Ohio. It is designed to deliver 3 gallons of oil per minute at 1,000 psi when run at 1,200 rpm, or 4½ gpm at 1,000 psi when run at 1,800 rpm. It is known as the Ten-Ton-Tony and requires about 2½ hp to operate at 1,200 rpm, according to the manufacturer. It measures 6 x 7 x 9 inches.

The unit consists of a Hydro-Power-developed gear pump, a valve housing, and a four-way control valve. The gears of the pump run in bronze bearings for smooth and quiet operation; the valve housing protects the check valves designed to eliminate momen-

tary dropping of the ram while it is being shifted; and the control valve permits the use of a double-acting cylinder which is hydraulically actuated

in both directions.

Remote control is attained through flexible or stationary linkage which leads to a lever mounted near the driver. Power is transmitted to the unit through a V-belt. Positive clutch action is included for cutout when the unit is not in use.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 5.

## Friction-Materials Line Is Described in Catalogs

Two folders which describe its brake linings and clutch facings are being distributed by the Gatke Corp., 228 No. LaSalle St., Chicago 1, Ill. One folder describes the Custom-Bilt asbestos brake materials, while the other emphasizes the versatility of types of Gatke brake linings and clutch facings—the large or small, standard or special.

Folder No. IND 1-46 describes the brake materials and points out several of their uses in power shovels, draglines,

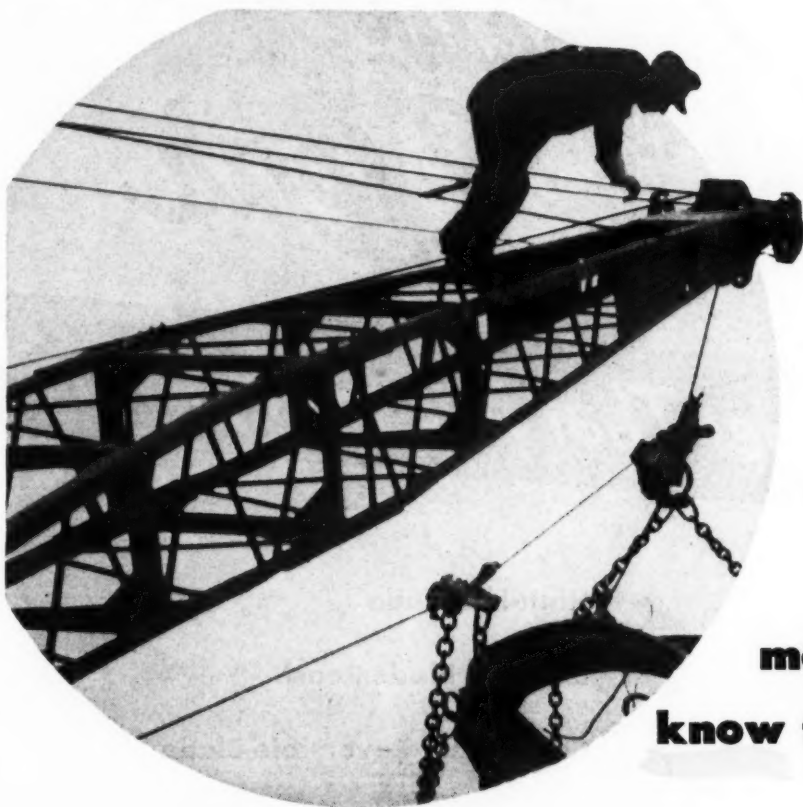
cranes, and other heavy-duty construction equipment. It lists all the sizes and types in which this material is provided. Other sections of the folder briefly describe the Gatke clutch facings and the Gatke bearings.

Folder IND 1-41 emphasizes the Gatke Makablok woven-molded brake lining which can be cut to fit brake shoes, bands, clutch facings, and other parts for a wide variety of equipment. It can be cut by a saw, and is provided in several lengths. The folder also lists all the products made by Gatke which is applicable to this type of work.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 82.

## Huber Executive Dies

A. W. Newby, Vice President, and former President, of the Huber Mfg. Co., of Marion, Ohio, died recently after a brief illness. At the time of his death, Mr. Newby was 70 years of age. He had been associated with Huber since 1903.



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know the ropes...

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every time!

MADE to close tolerances and unvarying quality standards by the world's largest manufacturer of wire rope, U.S.S. American TIGER BRAND Excellay Wire Rope possesses strength, toughness, and flexibility in the right combination to stand up tirelessly under long, hard service. See or call your supplier today. Our wire rope experts are readily available in the field to help you determine your needs and handle out-of-the-ordinary problems. No company offers a more complete engineering service.

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# New Giant Equipment Builds 100 Dwellings

## Big New Machines Pour Concrete Houses in One Spot; Then Pick Them Up And Carry Them to Site

By RAYMOND P. DAY,  
Western Editor

(Photos on pages 1, 62 and 63)

ONE of the first projects in the nation to see the new LeTourneau house-building equipment in use was scheduled for completion this month at Muroc Air Force Test Base near Muroc, Calif., about 100 miles north of Los Angeles. William Radkovich Co. of Los Angeles has built 100 new concrete dwellings, to be used by air-base personnel and their families, under a \$750,000 contract with the Los Angeles Office of the Corps of Engineers.

The houses were formed and poured at a central work yard. About 16 hours after they had been poured, the two sections which make up a dwelling were picked up bodily by a Tournalayer and carried off to the housing area to be set in place. Pneumatically applied mortar then tied the two sections together, and the same process built the roof eaves. Thus the Radkovich company built a long-life six-room house at a cost of \$7,500 per unit. Two LeTourneau Tournamixers and a Tournalayer, the gigantic new equipment doing the main part of the work, were rented on a per-house basis from R. G. LeTourneau, Inc.

### House Design

All houses in this contract are identical in design, but by facing and painting them differently in the new section, some variety is achieved. Each home has a floor-space area of about 1,300 square feet. It has two bedrooms, a large living room, a kitchen, dining space, a bathroom, and service porch. Six color combinations were contemplated by the U. S. Engineers when the project was visited.

It is likely that the new homes will be relatively easy to heat in the chill of desert winters at Muroc, and they are also designed to be cool in the sweltering heat of summer. The concrete walls are 5 inches thick, and the concrete roof and floor also help to achieve an insulating effect. The concrete was mixed by incorporating a special lightweight pumice aggregate with portland cement and water.

### Workmen Dig Foundations

The project was so highly mechanized that only one hand operation was necessary to set the houses in place. That operation consisted of excavating a foundation trench 12 to 14 inches wide and 15 inches deep. A crew of six men dug these foundations after soaking the natural ground with water to make it firm and easy to dig.

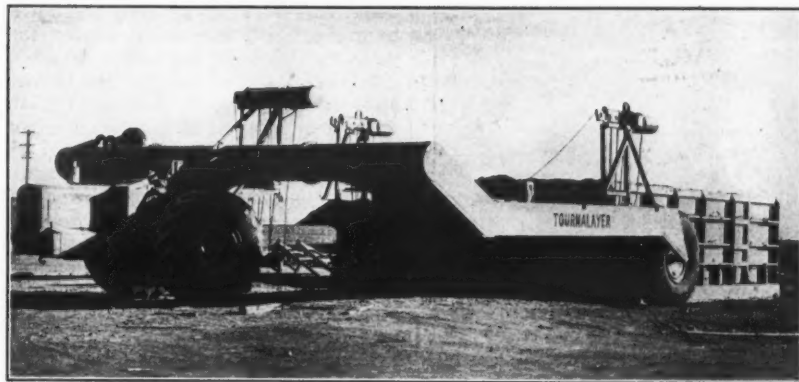
A cement-concrete footing 3 inches thick was then poured to lines and grades established by an Army survey party. This concrete was placed by one of the big LeTourneau 8-cubic-yard Tournamixers, hauling from the Noble batcher at the yard. Foundations were generally poured early in the day before pouring got under way on the houses.

### Main Work Done at Central Yard

The main part of the work was done at a central work yard 400 x 600 feet in area. Here Radkovich set up a job office, a mechanical repair shop, a Noble 80-ton aggregate batcher with a platform for bag cement, and the main work area where the houses were poured.

Four concrete foundations were poured. All the houses were then poured on these platforms. Short tunnels permitted men to go under the platform and come up under the house from inside in order to work on form bolts.

Four sets of LeTourneau steel house forms permitted two dwellings to be built in a 9-hour shift. Two of these forms made a large house shell 32 feet, 8 inches x 24 feet, separated by a center partition. Two of the forms made a shell 18 feet 8 inches x 24 feet. In order to build a dwelling, the small shell and one of the large shells were set close to each other, and when connected by Gunited walls and roof, the house was virtually finished with the exception of floor and finish work.



C. & E. M. Photo

This shot gives you a good idea of the Tournalayer's size—compared with a new 32½ x 24-foot concrete house at Muroc Air Force Test Base.

The inner sets of LeTourneau house forms remained in place on the four platforms for the duration of the job. Only the outer forms were pulled and moved.

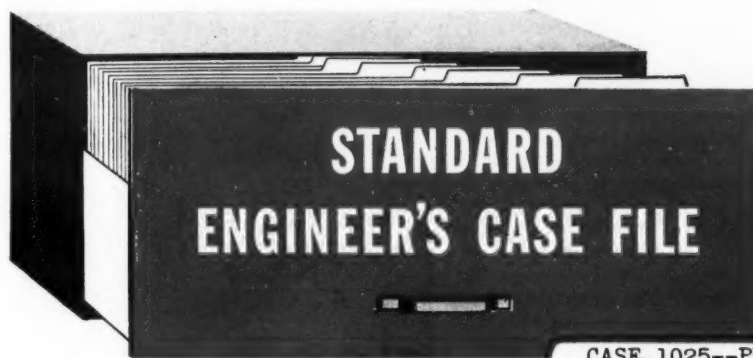
The central yard also contained a number of jigs for prefabricating the reinforcing mats for each house, and

the plumbing and electrical headquarters were also situated there.

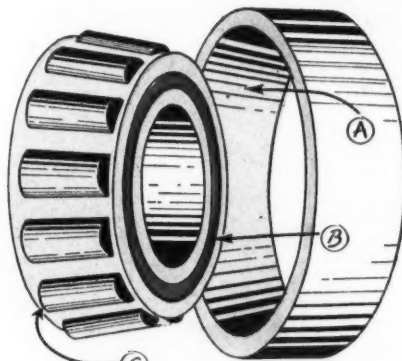
### Pouring the House Shells

The large house shells consisted of walls, roof, and a center partition, and were made in one monolithic pour.

(Continued on next page)



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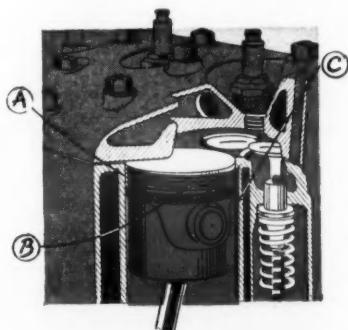
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C. &amp; E. M. Photo

Supervisory personnel on the Muroc Air Force Test Base housing job included Resident Engineer R. E. Ferguson, left, and Chief Inspector Vic Wheeler.

## New Giant Equipment Builds 100 Dwellings

(Continued from preceding page)

Crews had attained such a degree of proficiency by the time the work was visited that the 45-cubic-yard pour on the big units was being completed in 1½ hours. The 25-cubic-yard smaller units were being turned out in only 45 minutes.

All operations were streamlined; they were designed to move an assembly line of labor and equipment past the house with hairline timing. This could be done only by routing the various crews in the following sequence:

1. Workmen cleaned and scraped the inner form thoroughly, applied form oil, and expanded the steel sides to pouring position by means of a cam-actuated drive. Retraction or expansion of this inner form allowed a movement of 2 inches.

2. With the inner steel form in position, electricians then installed all electric conduits, outlet boxes, a master switch box, and other miscellaneous fix-

tures. This work was securely tied down to prevent any movement during the pour.

3. Prefabricated mats of reinforcing steel and 4 x 4 x ¼-inch steel mesh were then brought in. The steel crews had made these mats up previously on jigs in the yard. The wall mats were light enough to handle by hand, and the 8-man steel crew carried these over and stood them up. The heavier roof mats, however, had to be set and handled by an EC-15 Tournacran, which was powered by a Model C Tournapull prime mover.

It was difficult to hold the light wall steel mesh in place. But this problem was neatly solved when one of the men suggested cutting the wires in about four places and bending them outward to the wall-form lines. By this simple trick, the mats were held rigidly in place.

The roof mat was supported on tiny steel-wire chairs ¾ inch high. Vibration of concrete caused these chairs to float upward slightly, so that when the forms were stripped they could not be seen. Wooden platforms were set down over the roof mat to keep workmen from stepping on the reinforcement.

4. A carpenter crew, meanwhile, was busy installing window and door frames. These steel frames were bucked down to a wood framework to block out the required opening, and tied down. Electric welding was used to tie the frames to reinforcing steel, and to join the corners of the steel mats together.

5. The steel outer form, cleaned and oiled, was then brought in by a Tournalayer and set in place over the previous work. The outer form was built like the inner; both had a steel face ¼ inch thick, reinforced by 2 x 6 steel channel irons. These steel channels were used as studs and wales as ordinarily used in wood form work.

The outer form was then connected to the base by steel lugs—at six points on the large forms, at four points on the smaller units. These base ties gave

the form perfect alignment at that point, and made the remainder of the aligning job more or less automatic with the aid of steel form-tie bolts.

The large units required 128 of these spacer or tie bolts, while only 60 were needed on the smaller shell. LeTourneau has used an ingenious system here

to make these bolts serve two purposes. Not only do they hold the forms from spreading; they act as spacers, too. For a distance of 5¼ inches these bolts are ¾ inch in diameter. Then they collar down abruptly to ⅝ inch in diameter. When the steel form is locked down

(Continued on next page)



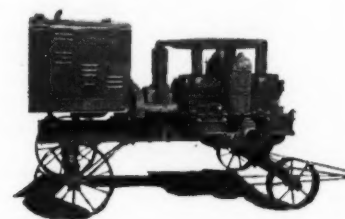
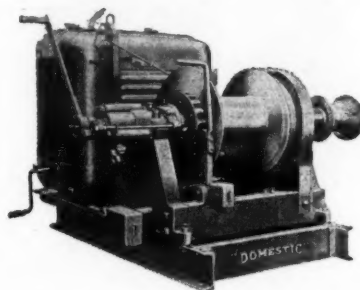
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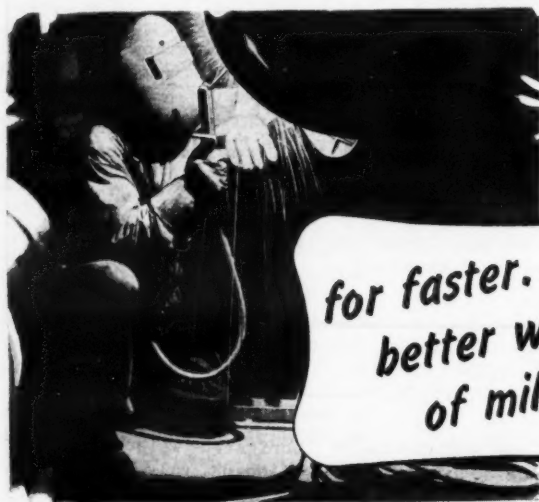
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snug and tight on this collar, the distance between forms is a precise 5 inches, and the forms cannot move either way.

6. With forms, steel, and embedded items in place, the unit was ready to pour. Large house shells required seven Tournamixer loads of concrete, each load containing 6.2 cubic yards, while the smaller units took only four loads. These huge mixers, incidentally, have been successfully loaded to as much as  $8\frac{1}{2}$  cubic yards with ease.

Powered by Model C Tournapull prime movers, the big mixers resemble nothing quite so much as huge pieces of field artillery. The aggregate and cement enter the barrel of one of these "cannons" through one or both of the 28-inch manholes. Water also must be added at the batch plant, at the time the mix goes in.

The concrete is mixed in the Tournamixers, when the barrel revolves in a counter-clockwise direction, by means of spiral baffles. When the direction is reversed, the baffles carry the mixture up to the end of the barrel. This baffle feed is so effective that the mixers are emptied thoroughly and rapidly.

The long barrel permits the Tournamixer to discharge its concrete 20 feet high, or at any lower point, simply by raising the muzzle by control cables. The great load of this machine rides on 21:00 x 25 Firestone tires. The Tournapull prime mover is electrically controlled.

Only four movements of the mixer were needed to make a large pour, and two set-ups finished one of the small shells.

As massive and complicated as these big machines appear to be, every man on the job knew how to operate them. The Muroc Air Force Base is relatively remote from near-by cities, so the turnover of operators and labor was great. One morning both operators failed to show up for work. Two green laborers were selected, shown how to run the machines, and turned loose. That day one of the large house units was completed in 1 hour and 24 minutes, which still stood as the best record on the project when the job was visited.

The Tournamixers backed up to the forms and began pouring usually at one corner. At first the houses started to strip with voids under the window blockouts. So the concrete was dumped in and vibrated from one side until it ran through in the clear on the other, thus filling all the space underneath the window frames.

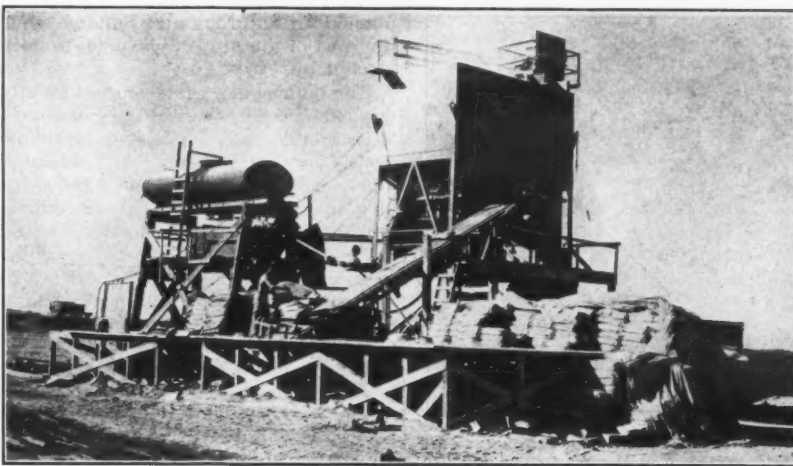
As the concrete was placed, usually at a slump of about 7 inches, internal and external Viber vibrators worked it into place. The large forms had five external vibrators fastened to the steel, with two smaller Viber internal stingers on top to help consolidate the mix.

When the roof was poured, the edges were masked with a piece of 1 x 12 board, leaving part of the steel exposed. This lip then bonded to the pneumatically applied mortar eaves. The walls which tie the two sections together also bond into a 2 x 4-inch key, masked in at this time.

The roof pour was given a steel-troweled finish, and the shells were allowed to cure about 16 hours before further work was done. Ordinarily the pours were made as early in the day as possible, and they stood overnight before being stripped.

7. Men then went inside the inner form and loosened all the tie bolts. Most of these bolts were removed, but a few were left in as a safety factor in lifting. The inner form was then retracted and the main bolts which tied the outer form to the base were taken loose.

A huge Tournalayer then backed in over the house and fastened on to the outside form in three spots. The outer form, carrying the house by the eave lip, was then raised straight up by means of the main drive and three leveling motors on the Tournalayer. The



C. & E. M. Photo  
Here's the Radkovich batch-plant set-up for the Muroc housing job—a Noble 80-ton batcher, a loading platform for cement bags, and a portable conveyor which carried the cement up to the batch bin at right.

house was lifted up entirely in the clear of the inner form, the huge machine crawled forward in the clear, and

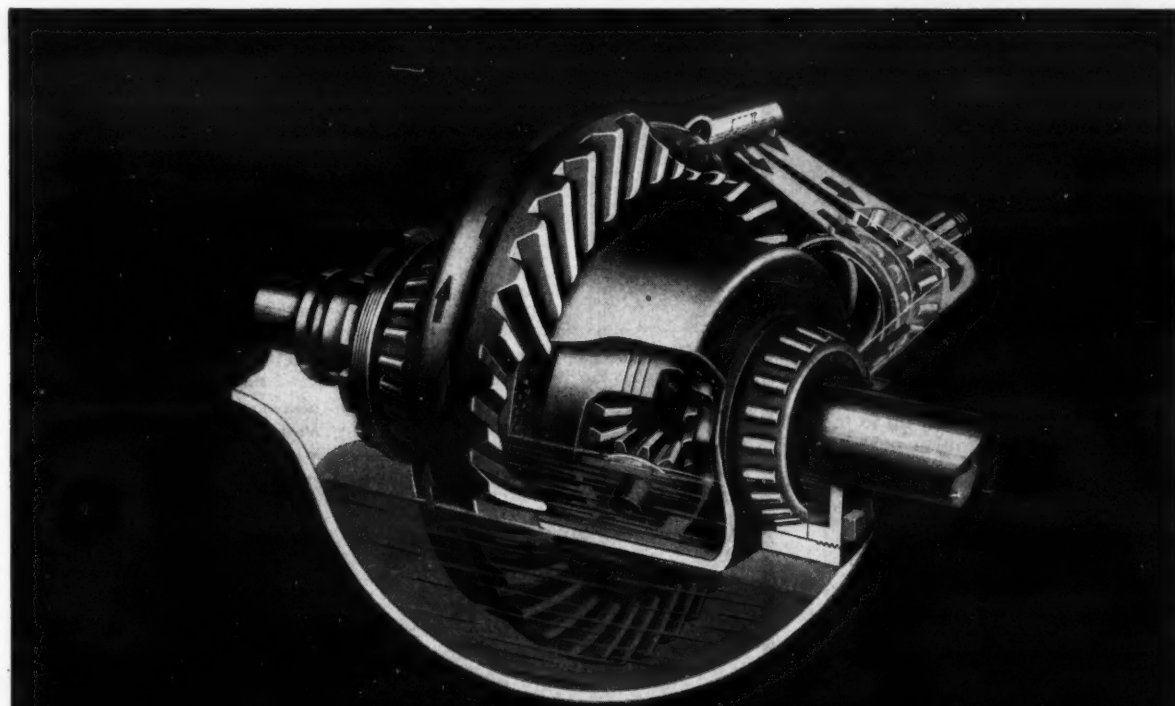
then the load was lowered to carrying position, about 3 feet off the ground. Altogether, the load amounted to about

60 tons in the case of the large unit. Big 30.00 x 40 rubber tires bore the load.

8. When the Tournalayer with its load backed in where the house was to be set, a foreman spotted it carefully. The corners of each house had to be within an inch of a surveyed location stake. This alignment was usually secured by putting the rear corner in true position. Then by backing or coming ahead on the prime mover, the other corners could be jockeyed into position with but a minimum of disturbance to the reference corner.

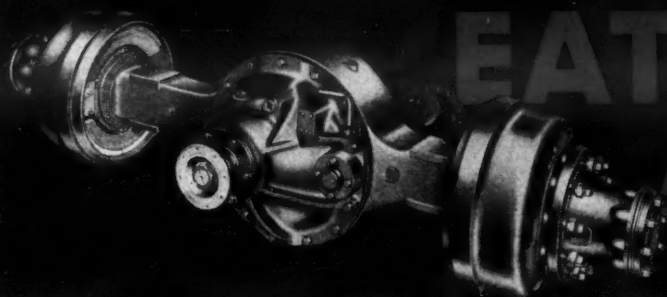
Men then hastily brought in a wood frame of 2 x 2's, cleated together 6 inches apart. This form was filled with cement-sand grout, mixed in a near-by Jaeger mixer. The grout served simply as a leveling course when the Tournalayer set the house down. This grout was laid down all around the foundation on the 3-inch slab previously poured.

9. The Tournalayer then gently set the house down on its foundation, hold-  
(Concluded on next page)



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## New Giant Equipment Builds 100 Dwellings

(Continued from preceding page)

ing a light tension on the cables. When the house rested solidly, men took 1½-inch wrenches and expanded the outer forms about 6 inches by means of a link and pin mechanism. This permitted the form to be lifted clear of the eaves. The Tournalayer then returned to the central yard with this outer form, and set it in place for another pour.

### Other Crews Finish Houses

When the job was visited, the Guniting work had not been started. Floors were being poured by the Jaeger mixer and a concrete crew with wheelbarrows. The floor was being laid down 3 inches thick, and given a troweled finish.

As soon as the wall and roof ties were made, carpenters installed cupboard space, windows, and other miscellaneous woodwork. Electricians finished their work, plumbers finished the bathroom, and finally painters came to spray the house with concrete paint. Painters had demonstrated on the inside of one of the homes that the finished result could be beautiful.

Air temperatures as low as 7 degrees above zero caused some concern, but failed to stop the work entirely.

### Batch-Plant Set-Up

The batch plant for the concrete was set up along the road through the main yard, only 400 feet away from the farthest form. Mixing water came from a well at the Muroc Air Base through 3 miles of 6-inch invasion pipe line.

Monolith high-tensile-strength portland cement was trucked in from the Monolith plant at Tehachapi, unloaded on a wood platform, and sent up to the batch over a 24-inch Farquhar portable conveyor. Two men stacked the cement sacks on this conveyor, and a third laborer at the top slit the bags with a knife, dumped the cement through a feeder screen, and tossed the paper bags aside. One of the hardest jobs on the project, this one was strangely in demand. The bag opener received a half hour of overtime work each day washing out the Tournamixers.

Fine pumice aggregate, weighing only 55 to 65 pounds per cubic foot in loose condition, was hauled 250 miles from a mine near Bishop, Calif. A Hall Scott and a Sterling transport, each hauling 26 tons, were used on this long haul.



C. & E. M. Photo

J. P. Tucker, at left, was LeTourneau's field engineer on the Muroc Air Force Test Base housing job. Joe Erb, at right, was General Superintendent for the William Radkovich Co.

Two GMC 14-ton dump trucks also were used. Ordinarily a round trip required about 20 hours, and the trucks

hauled on Saturday and Sunday while the rest of the project was idle, to keep caught up.

The pumice aggregate was not strictly graded, and an excess of fines or coarse sizes could easily play havoc with the consistency of the mix. An excess of fines, of course, always made for a dry mix and caused extra water to be added.

The concrete was calculated on the basis of 6.52 sacks of cement per cubic yard, and 6 gallons of water per sack of cement. The pumice aggregate had a minus 16 per cent absorption factor.

Each 6.2-cubic-yard batch was weighed out according to the following scale weights:

Pumice aggregate	9,744 lbs.
Cement, 37 bags	3,478 lbs.
Water	400 gals.

The aggregate was dumped at the Noble batcher, pushed to a trap by a Caterpillar D4-mounted LaPlant-Choate bulldozer, and raised to the aggregate bins by a bucket elevator. The Noble plant was operated by a 50-kw

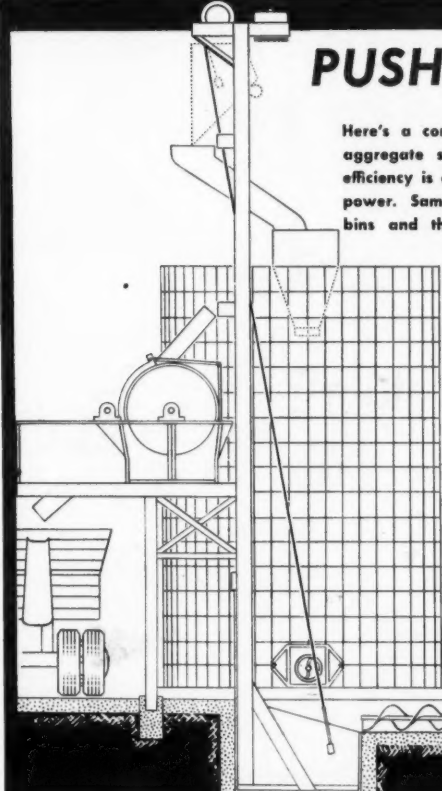
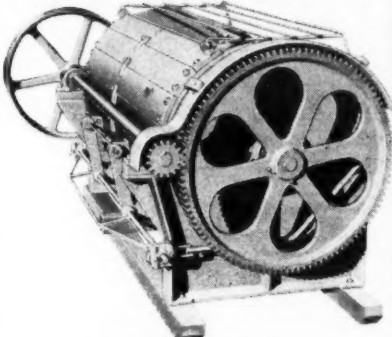
electric generator.

### Personnel

This Air Force project, the first of several required to develop the test base, has been carefully watched, especially in the initial stages, by the Base Commanding Officer, Colonel S. A. Gilkey, United States Air Force. Colonel Gilkey's able assistants in this matter were Major Joseph J. Lamoureux, Air Installations Officer, and Major Stanley J. Gawelko, Plans Office. These officers will accept the project, upon completion, for the Air Force from Colonel A. T. W. Moore, USA, Los Angeles District Engineer, under whose general supervision the job was designed and administered.

Joe Erb was the General Superintendent for Radkovich, R. E. Ferguson was the Resident Engineer, and J. P. Tucker was the field engineer on the project for R. G. LeTourneau. Started September 1, 1947, this job was scheduled for final completion before April 15, 1948.

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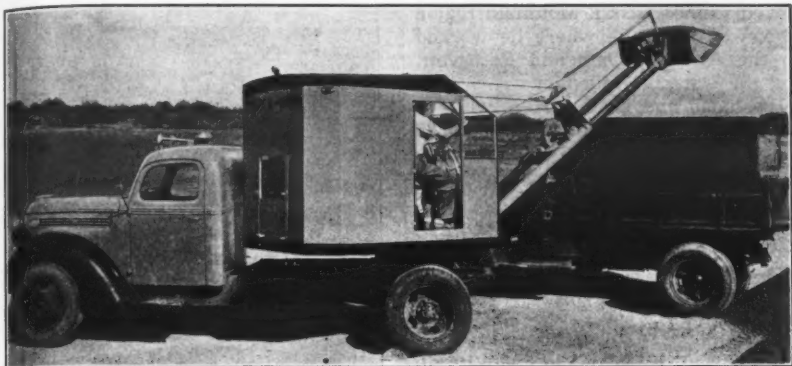
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The Quick-Way Model J full-revolving scoop pictured here has a  $\frac{3}{8}$ -cubic-yard capacity. The other new scoop which has been announced by the company is the Model E, which has a  $\frac{1}{2}$ -cubic-yard capacity.

### Truck-Shovel Scoop

A full-revolving materials-handling scoop, a new attachment for its truck shovels, has been made available by the Quick-Way Truck Shovel Co., 4150 Josephine St., Denver 5, Colo. It is made as a standard attachment for the Model E or Model J shovels, and is designed to revolve a full 360 degrees.

The 4-foot Model J scoop has a  $\frac{3}{8}$ -cubic-yard capacity; a dumping radius of from 6 feet 1 inch to 15 feet 4 inches; a dumping height of from 2 feet 9 inches to 14 feet 5 inches; and a digging radius of from 12 feet 6 inches to 17 feet 6 inches. The 5-foot Model E has a  $\frac{1}{2}$ -cubic-yard capacity; a dumping radius of from 6 feet 11 inches to 16 feet 7 inches; a dumping height of from 3 feet 7 inches to 16 feet 6 inches; and a digging radius of from 14 feet 4 inches to 19 feet 5 inches.

The scoop is interchangeable with other Quick-Way attachments—shovel, crane, dragline, trench-hoe, clamshell, pile driver, etc. The company recommends these scoops for handling gravel, dirt, aggregates, and for leveling, snow removal, or similar uses. A larger bucket is available for handling light materials such as cinders.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 19.

### Bulletin on Portable Saw

A broadside on its portable power saw has been prepared by the Harry A. Lowther Co., 141 W. Jackson Blvd., Chicago 4, Ill. It emphasizes the use of the Lowther Co-Saw in felling, bucking, cutting, and in land-clearing operations.

It features a large photograph of the saw in which Lilliputian lumbermen point out several of the advantages claimed for it. These include a balanced frame, easy-rolling wheels, heavy-duty tires, new-type saw blade, the power unit, the saw mandrel, and the constant-centered drive.

The broadside describes all of these features in detail. And photographs show the saw in use in many locales and under many operating conditions.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 71.

### Data on Hard-Facing Rods

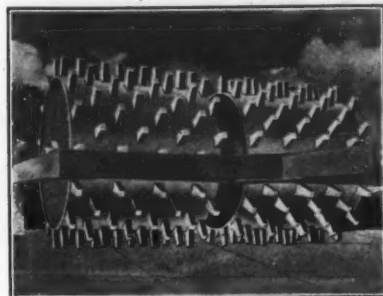
Descriptive literature on its line of hard-facing weld rods has been put out by Coast Metals, Inc., 1232 Camden Ave., So. W., Canton 6, Ohio. These

arc-welding uses. The catalogs list the sizes and types in which each rod is made and the proper way to use each. They describe the method of preparing the surface, the thickness of overlay required, finishing procedures, and much other data relevant to the maintenance and repair of equipment which is subject to wear and abrasion. These folders tell how to identify the various rods. They also list other literature available which is designed to help solve maintenance problems through the hard-facing process.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 58.

### Large Tamping Roller

A heavy-duty sheepfoot roller is available from the Shovel Supply Co., 4900 Hines Blvd., Dallas, Texas. The Gebhard Model No. 120 tamping roller is designed to provide a bearing pressure of 590 pounds per square inch of foot area. Empty, the drum is said to



The Gebhard No. 120 sheepfoot roller provides a bearing pressure of 590 pounds per square inch of foot area. It comes in one or two-drum units.

have a bearing pressure of 320 psi.

The Gebhard roller is made in one or two-drum units. The double unit is attached to a central draw shaft equipped with heavy steel hinges. The special wedge-shaped feet are hard-surfaced for long wear.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 27.

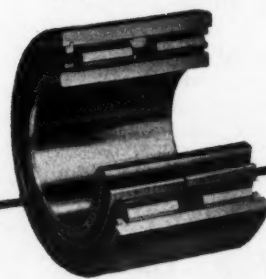
## QUIZ GAME

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ASPHALT

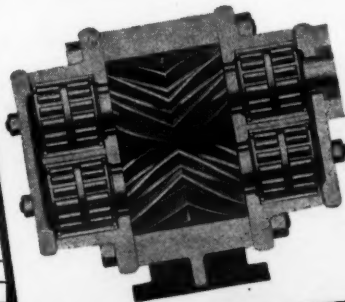
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Success in "unusual" applications like this simply goes to show that in any kind of application—wherever you need dependable bearings you **WIN WITH HYATT**. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.



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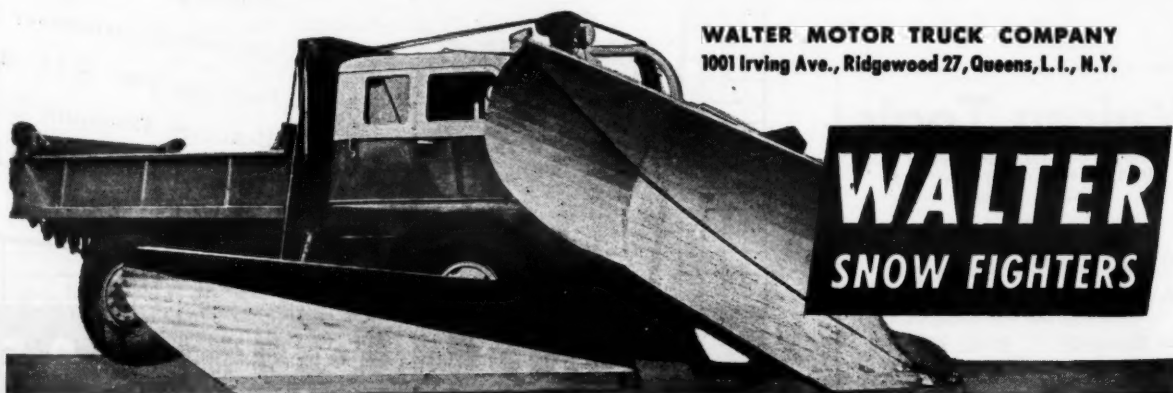
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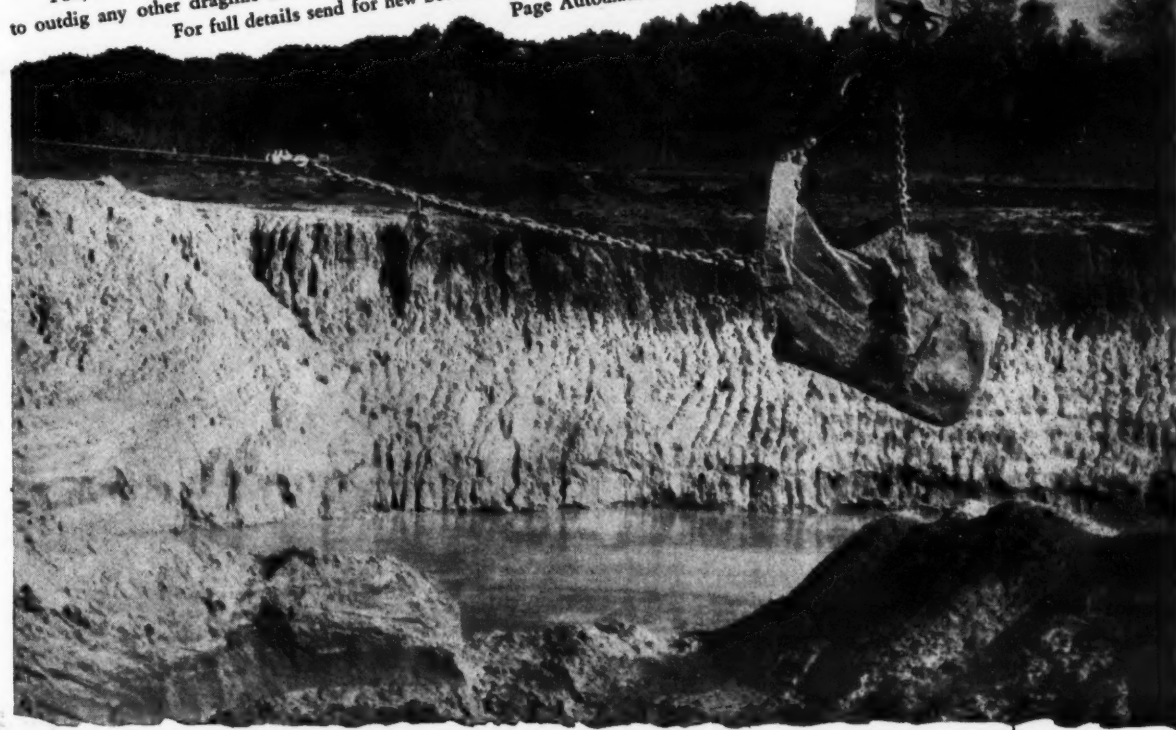
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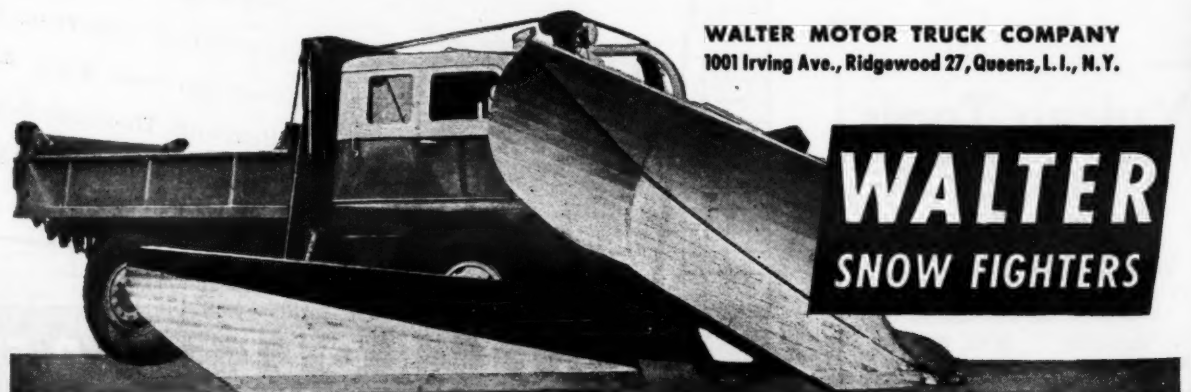
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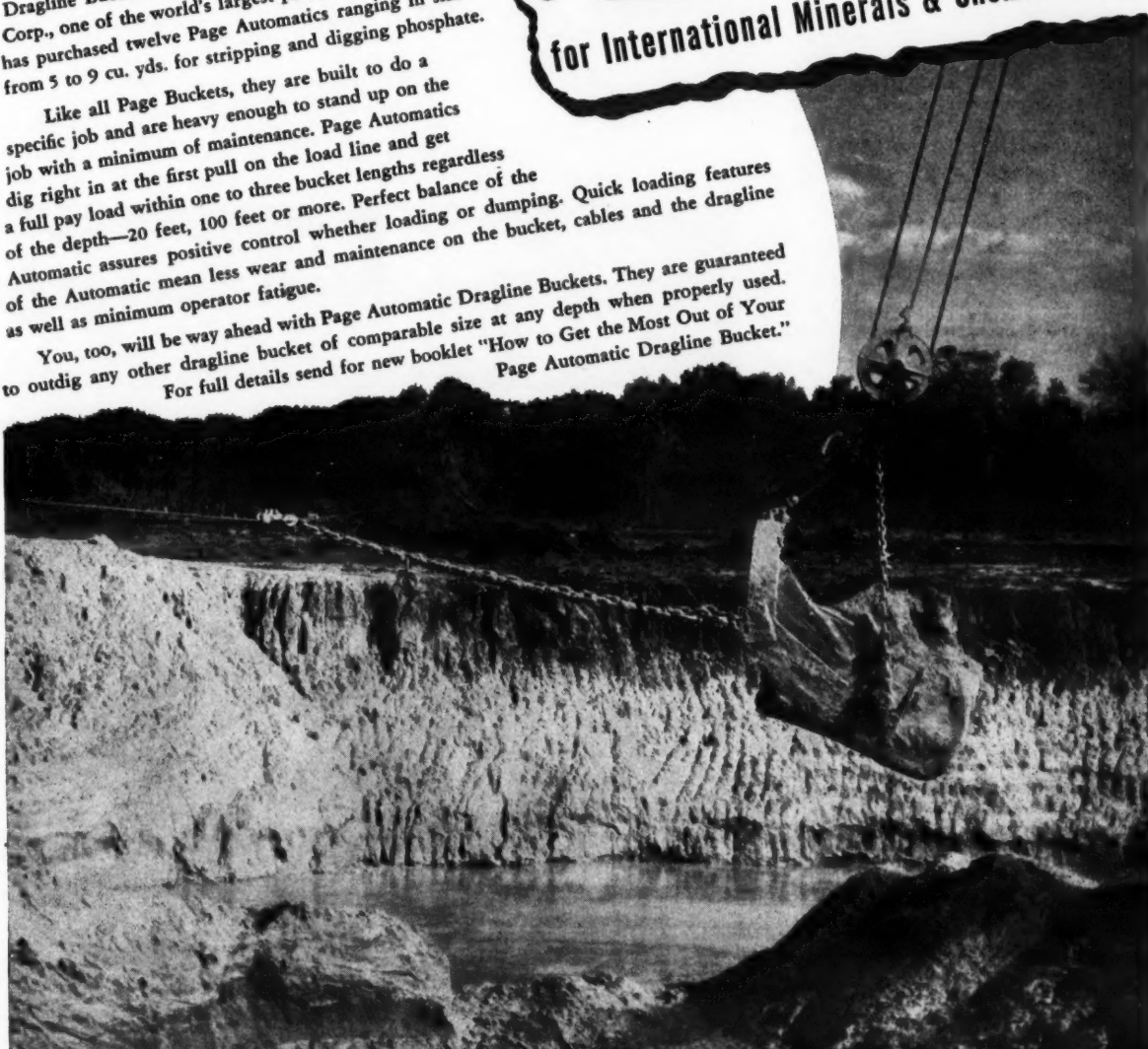
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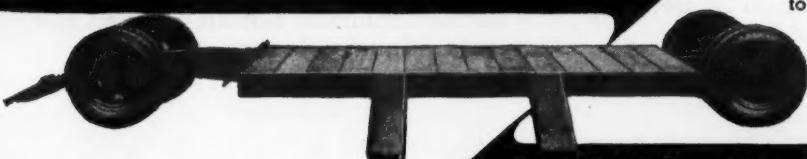
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## Contracting, Mining, And Baseball Do Mix

(Continued from preceding page)

seven, together with the six and four children respectively belonging to brothers Joe and Charles.

### Expansion Program

With the background and experience gleaned from their father, the four sons developed the contracting firm gradually over the years. Real expansion started in 1928, and since then the company has had a steady growth year after year even during the depression. During those slump years several projects were picked up by Perini after the original contractor had defaulted his surety bond. In each instance he made a profit where others had failed.

He attributes this excellent record to two factors. The first was a good organization in which the members pulled together, made necessary sacrifices, and buckled down and worked a little harder and longer. The other factor was equipment. From the beginning Perini has been one of the foremost exponents of the use of modern and better equipment to do jobs more economically and faster. If equipment manufacturers lag behind in supplying a special machine needed to do a particular job, Perini will make the necessary device himself in his shop. He favors buying rather than renting equipment, and then selling when it is no longer needed. Thus even during the depression he was prepared to tackle jobs that other contractors, without adequate machinery, could not risk taking when they had to rent their equipment.

### Big Projects

One of the early contracts which Lou Perini recalls with pleasure, because it set a concrete-paving record, was the construction of the Worcester Turnpike in 1932. The Turnpike is State Route 9 out of Boston westward to Worcester. In a single 8-hour day, Perini's concrete-paving crew laid over a mile of a 10-foot-wide strip of concrete, 9 inches thick, using side-discharge truck-mixers and mechanical spreaders and finishers. This job record exemplified the combination of good organization and proper equipment.

Another project which brought credit to the Perini organization was the Park River Conduit in Hartford, Conn. There the company trapped over a mile-long stretch of the Park River, which formerly flowed through the heart of the city and flooded it periodically. Now the river is contained in a mammoth rectangular concrete tunnel, on top of which has been built a 4-lane concrete-paved parkway.

During the last war the Perini company's greatest single construction contribution was building the Letterkenny Ordnance Depot at Chambersburg, Pa. Only a flexible and resourceful contractor could have handled this widely diversified job which included the construction of roads, bridges, railroads, warehouses, and electrification installations.

Unlike most contractors in those lush years of war contracts, B. Perini & Sons, Inc., never took a fee contract, nor did it seek any. Every job it was awarded was on a low-bid basis. This almost unique attitude meant that the company saw many competitors, or even firms that were considered to be much smaller operators, walking off with jobs bigger than they had ever handled in the past. But Perini was adamant. He felt that when the war was over he would still have a hard-working competitive organization intact, unspoiled by contact with the leisurely-paced costly work done on a fee basis.

### Post-War Activities

This long-range viewpoint seems justified by a look at some of the Perini

post-war activities. One contract for over \$4,500,000 included the largest tonnage item of asphaltic concrete ever awarded on a highway paving job. This was on the 47-mile Maine Turnpike from Kittery at the New Hampshire border north to Portland, a 4-lane divided express highway that required over 500,000 tons of plant-mix paving material. A total of five asphalt plants kept eight finishers working at top speed, and the contract was completed in a little over five months calendar time. Perini bought new plants, crushers, rollers, and finishers for the work, and is now selling them. If another such job comes along he will again buy the newest and most modern equipment available for the job.

"I expect to see more of these long toll expressways", Perini said. "I'm all for them, and not just because I'm a contractor who favors construction anyway. These roads are badly needed, and state highway departments have to spread their funds around too thin to build these great highways. After the



C. & E. M. Photo

Strung out on Lou Perini's office desk at Framingham, Mass., is a folder album of his wife and seven children.

tolls pay off the construction costs, the roads will then be free."

Big jobs around Boston include the

enlarging of the East Boston Airport, now nearing completion, and the recent

(Continued on next page)

**NO JOB TOO SMALL  
NO JOB TOO LARGE  
for**



**HENDRIX**  
*Lightweight* **DRAGLINE  
BUCKETS**

**3/8 TO 40 CUBIC YARDS**

**10% to 14% Manganese**  
Chains and fittings are standard  
on all types and sizes.

### 3 TYPES DESIGNED FOR EVERY DIGGING CONDITION

- LS** ..... A lighter weight bucket designed for levee and drainage work.
- TS** ..... A medium weight bucket, classified as a general purpose bucket.
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- ★ 20% to 40% lighter than other buckets, type for type.
- ★ All welded construction for greater strength and durability.
- ★ Manganese Steel Chains, Fittings, and Reversible Tooth Points.
- ★ Full Pay Load every trip, even in wet digging.
- ★ Perfect Balance; handles easier, fills faster, dumps cleaner.

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MANSFIELD INCORPORATED LOUISIANA

award of a \$9,500,000 high-pressure water-supply tunnel contract for the Boston Metropolitan District Commission. The latter project, 6 miles long, will take over three years to construct. Three other contractors are associated with Perini in the tunnel contract. He has also joined forces with four contracting firms to build the Downsview Dam for the New York City Board of Water Supply. Some years ago Perini worked on other deep pressure tunnels in New York at Lackawack and Mt. Kisco.

#### Coal Mining

Perini, naturally, was one of the many contractors who helped to construct what is still recognized as the country's greatest highway—the 160-mile-long Pennsylvania Turnpike. His contribution was boring the Tuscarora Mountain tunnel. While working in Pennsylvania he noticed some coal strip-mining operations, and saw that they constituted essentially a big dirt-moving job. In 1943 he proceeded to acquire some likely looking sites and moved in a few of his larger shovels, draglines, and hauling equipment. Before long he realized he would need still bigger and heavier machines, better suited for this specialized field. He is now getting new equipment, and the original holdings have continually expanded.

At present Perini is working six strip mines located in Pennsylvania, West Virginia, and Kentucky, and is about to begin operations at two additional sites. He is also buying equipment for deep-coal mining. A branch office of B. Perini & Sons, Inc., has been established in Somerset, Pa., for handling the coal operations. Last year the firm mined over 1,000,000 tons of coal; this year it hopes to do even better. Lou Perini is in the coal-mining business to stay.

#### The Boston Braves

Perini's interest in acquiring the Boston National League Baseball Club dates back to 1936 when he, along with Joseph Maney, a Boston contractor, and Francis P. Murphy, a shoe manufacturer and one-time Governor of New Hampshire, tried to buy the franchise. C. F. Adams, a grocery chain-store tycoon, then owned the controlling interest, and as the Braves were nearly scalped financially it looked as though the deal might go through. But Perini and his friends were out-maneuvered at a stockholders' meeting. Undismayed Perini bided his time, and five years later got another chance at the club.

In 1941 the late Judge Kenesaw Mountain Landis, baseball czar, cracked down on Adams because of his connection with the Suffolk Downs race track, and made him sell his stock in the Braves. Adams sold to twenty different sports-minded individuals, among whom were Perini, Maney, and Guido Rugo, another Boston contractor.

This multiple ownership helped the Braves get nowhere fast. They kept floundering around, while the fans lost interest in their feeble efforts and stayed away in droves. The stockholders were continually being assessed to make up operating deficits. Finally during the 1943 World Series between the New York Yankees and the St. Louis Cardinals, the Braves stockholders met in New York to make up still another deficit.

Perini, by that time exasperated at tossing good money after bad, told the rest of the stockholders that he was no longer interested in the existing ownership set-up, and offered, with his two associates, contractors Maney and Rugo, to buy up the stock of the others. Or if that was not agreeable, he would sell his small share at the same price he offered for theirs. The others agreed to this frank proposition, and the Three Steam Shovels, as Perini, Maney, and Rugo were tagged, took over the Braves. Lou Perini, the President, holds 50

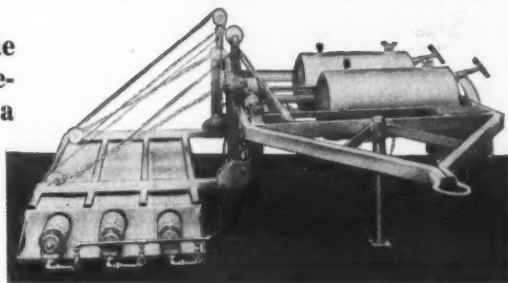
per cent of the stock with his brothers, while Maney, the Treasurer, and Rugo, the Vice President, account for the rest. Maney and Rugo are also associated with Perini on the new Boston Tunnel contract and the new dam project in New York. The fourth contractor on the latter job is the Walsh Construction Co. of New York. Its president, Tom Walsh, was at one time part owner of the Cleveland Indians.

#### Old Methods in New Fields

The three contractors brought a fresh viewpoint to the broken-down Braves, and applied the same business principles to running a ball club as they did to a contract job. "Naturally we don't tell our Manager, Billy Southworth, how to run the team," Perini insists, "any more than we would tell a competent superintendent on a large construction project how he should disperse his foremen and workers."

By sticking to business and trying to please the fans by presenting first-division baseball, Perini and company have achieved some surprising results (Concluded on next page)

Why Destroy the Base of a Pavement to Apply a New Surface?



#### White Oil Burning Surface Heaters

These machines offer the quickest, cleanest, most economical method for repairing or resurfacing any bituminous pavement.

They melt 1" of old surface in 5 minutes. It can then be scraped away and new top applied without damaging the base course. This has been successful practice for many years.

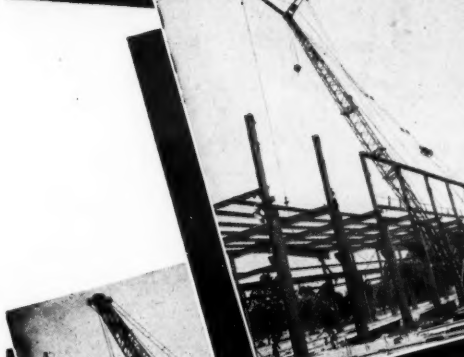
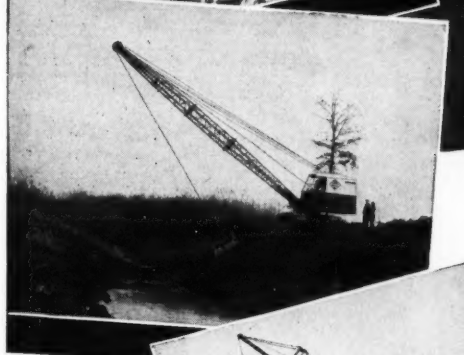
Made in 2 sizes. Model B-4, illustrated, has 3 x 6' pan. Model B-1 has 6 x 6' pan, with 6 burners and is especially suited for large areas. They can be towed to the job and then moved by hand during operations. Pans have square cutting edges. Dual fuel tanks. Steel wheels, semi-elliptic springs.

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**CRANES . . .**  
**DRAGLINES**

Capacities . . .

SHOVELS

3/4 YARD TO 3 1/2 YARDS

CRANES

13 TONS TO 100 TONS

DRAGLINES

VARIABLE

## Contracting, Mining, And Baseball Do Mix

(Continued from preceding page)

in attendance. In 1944, the year they acquired the team, the Braves played to only 275,000. In 1945 this figure jumped to 475,000. The following year, 1946, 975,000 fans paid admission to the Braves games. And last year a new attendance record was set when 1,300,000 people went to Braves Field to see the team that the three hustling contractors were responsible for. From a firmly entrenched second-division ball club in years past, the Braves moved steadily upwards to finish third last year.

As Lou Perini developed a great construction company, he also hopes to develop a National League pennant winner in Boston. The fans are pulling for the Braves, from the old down to the very young. On Perini's desk in Framingham is a pen set presented to him last year by the Knot-Hole Gang. His interest in this group of youngsters, numbering in the thousands, has enabled them to see all the Braves home games free.

### Small Fry

Perini's generosity in getting young boys in free at the ball park sometimes backfires with amusing results. Last year a disabled veteran lost a wallet containing \$200 at Braves Field. It was later found by two youngsters and returned to the ball park front office. Perini was so pleased at the boys' honesty that in addition to the \$20 award that they received, he presented each boy with a season's pass to all games, and a personal invitation to sit with him in his private box whenever they came to the park.

Apparently the news of this munificence spread quickly over the Boston area via some juvenile underground. "Soon," said Perini with a laugh, "the front office was besieged with boys turning in cheap wallets containing a dollar or two. In return they expected at least a season's pass for their 'honesty'."

### Traveling Man

Perini is probably one of the most difficult executives to locate, for he seldom stays put in one place for any length of time. Theoretically he should be found in Framingham, Mass., a small

city about 20 miles west of Boston, and the headquarters for the contracting firm. Fifteen years ago when the Ashland office went up in flames, Perini looked around for new quarters in that vicinity and came upon a vacant phonograph-record factory in Framingham. He converted this rambling place into a combined shop and office. Since 1925 he has been President of the company. His other brother Joe is Treasurer, and Charles, a younger brother, is Vice President. The other brother, Fred, has retired from the firm. Lou Perini's home is in Wellesley, a suburb of Boston.

When the busy contractor is in Framingham, he usually makes up for days away from headquarters by working long hours in the big office, eating lunch at his desk to save time. Strung out on the desk is a folder album of his family, while on the wall facing him is a charcoal drawing of his late father.

But Perini is still a field man, and his many diverse interests keep him on the move. If it isn't a construction job to look after, it is a coal mine to visit.

And from the time the Braves start spring training in Bradenton, Fla., until the baseball season winds up in October, Lou Perini can generally be found at a ball park. And not just the ball parks in the National League.

The Braves have a far-flung farm system, and their President takes a keen interest in all these minor-league teams which the club owns. They include: Milwaukee of the American Association; Hartford of the Eastern League; Evansville of the Three-I; Eau Claire, Wis., in the Northern League; Richmond, Ind., in the Ohio State League; Bluefield, W. Va., in the Appalachian; Owensboro, Ky., in the Kitty League; Marysville, Calif.; and Pawtucket, R.I., in the New England League. In addition the Braves have working agreements with eight other clubs. So Lou Perini gets around.

### Outgrown the Hobby

"Baseball used to be a hobby with me", Perini observed with that quick-breaking infectious smile that enables

him to make friends easily. "Now it is a business, but to me a mighty pleasant one. I like to watch these young fellows coming up, see them develop, and help them along if I can. I like to get around to these smaller clubs, once a year anyway, to visit with the players and their folks. Baseball, I think, can be a wonderful influence for good on young men and boys.

"This coming year I have a big tunnel job in Boston, so I hope to see more of our home games than ever with our construction project close by. That will please my little girl Helen. She sits in the box with me, and though she's only six, she knows all the players by name. She also understands the game as well as some of her older brothers and sisters do, if not better."

If one small female rooter has her way, the Boston Braves are sure to win that National League pennant in '48.

"All social progress resolves itself into the making of good roads", said John Ruskin.

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**Yaun**

The Yaun Shell type, the all time, all purpose bucket.

Perforated with the size hole you request, this bucket is "made to order" for you.

Yaun's basket type, for thick wet, hard to handle material

Ask a dragline operator why he prefers a YAUN. He'll tell you in one word—Service. Yaun means service because it does a job better and faster with less costly operator fatigue. Every trip with a Yaun carries a full load. Precision built, all parts are of manganese steel. Ask the man who uses a Yaun. He'll tell you.

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Light Weight  
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The new Arnold Lubricator supplies oiled air\* for all pneumatic tools.

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Order from your dealer.  
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## Vehicles Converted To All-Wheel Drive

Conversion units to provide all-wheel drive on 1948 Ford vehicles are now in production by the Marmon-Herrington Co., Inc., 1511 W. Washington St., Indianapolis 7, Ind. These units can be installed on all standard trucks. And on the larger sizes, they can be used to convert to either 4 or 6-wheel drive. They are designed specifically for Fords, and become an integral part of the truck.

The original front-axle assembly is removed and a new front driving axle installed. This axle has a standard Ford differential, ring, and pinion gears, and is equipped with specially designed constant-velocity universal-joint steering ends. On units smaller than 1-ton, a transfer case is installed for transmitting power to the front-axle propeller shaft. On units of 1 ton and over, a new two-speed auxiliary transmission of Marmon-Herrington's own design is installed. On 6-wheel-drive

models, the frame is lengthened and reinforced and a third driving axle and wheel assembly is installed. Necessary changes are made in steering assembly and hydraulic brake connections.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 31.

## Hand Cutting Tool

A hand tool for cutting steel rods up to 1/4-inch diameter is made by the Manco Mfg. Co., Bradley, Ill. It is designed to fill the shop need for a hand tool in between wire-cutting pliers and bolt cutters. It is 12 inches in length.

The manufacturer states that a pressure of 50 pounds at the handle is converted into a pressure of 2 tons at the cutting jaw. The Manco Junior can be used with rods, screws, rivets, nails, or fencing of any hardness up to heat-treated or hardened steel.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 2.

## Tank-Leveling Jack

Its series of jacks for leveling and supporting bins and tanks has been redesigned by Templeton, Kenly & Co., 1006 So. Central Ave., Chicago 44, Ill. These screw-type jacks are intended to facilitate the installation of horizontal and vertical storage tanks. The screw adjustment is said to produce exact leveling, regardless of variations in the base or other supporting members. And it is said that vibration or pounding in the tank will not disturb the jack level. Simplex No. 9207 jacks are made in a wide range of sizes and capacities.

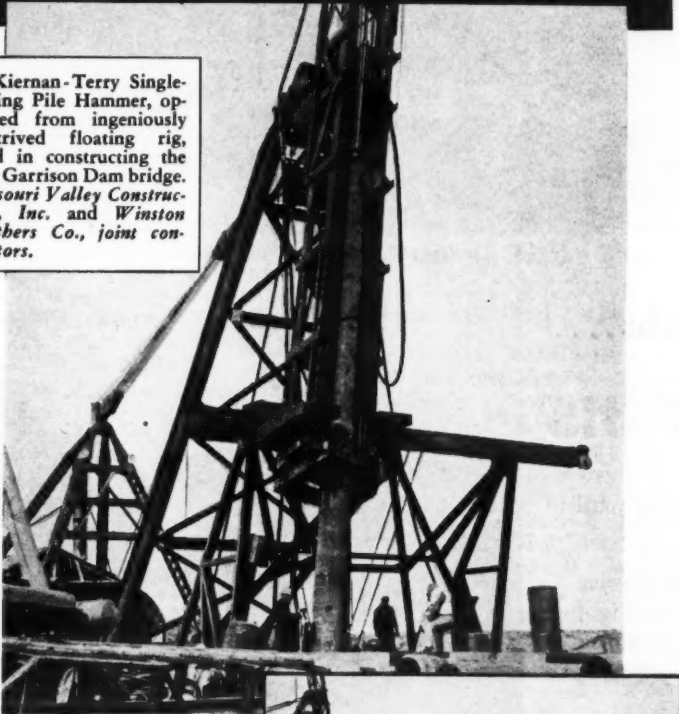
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 24.



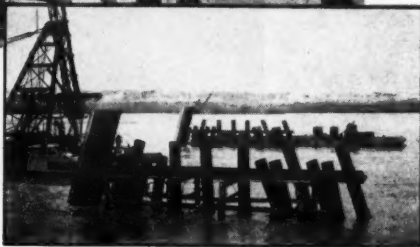
Simplex screw-type jacks are shown here supporting and leveling water tanks.

## PRECISION DRIVING OF BIG STEEL PILES

McKiernan-Terry Single-Acting Pile Hammer, operated from ingeniously contrived floating rig, used in constructing the new Garrison Dam bridge. Missouri Valley Constructors, Inc. and Winston Brothers Co., joint contractors.



One of the eight piers that support the Garrison Dam bridge, showing complicated positioning of batter piles. Each pier founded on 15 piles — 3 driven vertical and 12 on a 4 to 12 batter in six different directions.



In selecting equipment for building the 1350-foot rail and highway bridge across the Missouri River at Garrison Dam, North Dakota, the contractors made the wise choice of a No. S-10 McKiernan-Terry Single-Acting Pile Hammer.

This difficult job involved driving 24-inch tubular steel piles, 100 feet long, into the glacial till of the river bed at six different angles, to insure stability against scour, ice and floods. In each of the six deeper water piers three downstream piles were driven to the unusual

bearing load of 180 tons. All other piles were driven to 150 tons bearing.

The successful handling of this complex pile-driving job is added evidence of the dependability of McKiernan-Terry hammers... however complex or difficult the job, contractors always find the correct hammer to handle it in the McKiernan-Terry standardized line of five SINGLE-ACTING hammers, ten DOUBLE-ACTING hammers and two DOUBLE-ACTING extractors. For full information, write for free Bulletins No. 55 and No. 57.

**McKiernan-Terry**  
CORPORATION

19 Park Row

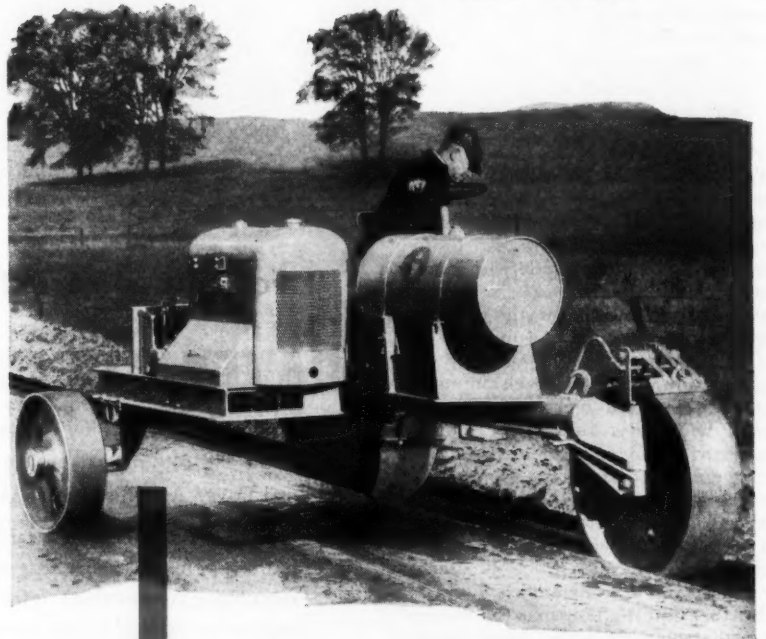
New York 7, N. Y.



## A TRENCH ROLLER

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Compacting widening strips and trenches economically and efficiently is the prime purpose of this roller. The leveling roll can be adjusted to permit compaction at a range of depths by means of a simple, low pressure hydraulic leveling mechanism. Compressions exceeding 300 lbs. per inch of face can be obtained with this roller.

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## Frost Action of Soils Subject of New Book

A discussion of soil freezing and frost heaving, with special application to roads and railroads, is now available from the Technological Institute of Northwestern University. The data for this report were obtained by Gunnar Beskow, Ph.D., of the Swedish Road Institute, Stockholm, Sweden. The report was translated into English by J. O. Osterberg, Ph.D., Assistant Professor of Civil Engineering at Northwestern. Dr. Beskow has devoted most of his life to the study of the frost action of soils, and is the author of several publications on the subject. This report summarizes his studies up to 1935. A supplement written especially for the English translation summarizes the work done in the Scandinavian countries since then.

The book discusses first the mechanics of soil freezing. It covers the structure of frozen soil and describes the process of soil freezing. It tells how heaving is caused by the freezing of water which is present in the soil and by the suction of water up to the frost line. Among the hydro-dynamic considerations of frost heaving, Dr. Beskow discusses capillarity, permeability, and the process of water suction. Another chapter covers temperatures in freezing ground. The report is well illustrated by photographs, drawings, and charts.

Copies of this report can be obtained from the Technological Institute, Northwestern University, Evanston, Ill. The book costs \$3.00 per copy. It is 8½ x 11 in size, and contains 145 pages.

## All-Metal Slide Rule

An all-metal ortho-phase log log slide rule is announced by Pickett & Eckel, Inc., 1111 So. Fremont Ave., Alhambra, Calif. Made of a plastic-covered magnesium alloy, it is designed to give accuracy in readings under all atmospheric conditions. It is 12½ x 1½ x ½ inch in size, and bears the standard log log scales. Weight is 4 ounces.

Other advantages claimed by the manufacturer include: precision manufacturing to 0.001-inch tolerance; the cursor window is held away from the scale surface by a special cursor centering groove and spring channel; an optical groove centers the slider and makes hair-line settings possible with no stick, bind, or wobble; and the non-fade scales are said to be unaffected by grease, oil, or constant cleaning.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 34.

## Hydraulic-Cylinder Data

A 24-page catalog describing its complete line of hydraulic cylinders has been prepared by the Hydro-Line Mfg. Co., 711 Nineteenth St., Rockford, Ill. Catalog H-47 is designed to serve as an aid to engineers in choosing the size and type of cylinder best suited for a specific application. It includes charts for determining the relationship between area, volume, and velocity, and between area, force, and pressure.

The catalog covers the principal construction features of the cylinders

and shows the seven styles in which they are made. For each of these styles, there is a drawing of the unit which indicates its principal dimensions. Tables alongside these drawings give complete dimensions for each size of bore in which each style is available. Bores range from 1½ to 8 inches in diameter.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 53.

## Heavy Dozer Blades For 180-Hp Tractor

Bulldozer and angle-blade dozers for use with the new International TD-24 crawler tractor are manufactured by The Heil Co., 3000 W. Montana Ave., Milwaukee 1, Wis. They are cable-controlled through a special Heil power-control unit developed for use with this tractor. The TD-24, made by the International Harvester Co., is said to develop 180 hp at the flywheel and 140 hp



Here's the new Heil bulldozer designed for the International TD-24, and a 25-yard Heil scraper. The bulldozer blade can be lifted 4 feet above the ground.

at the drawbar.

The Heil bulldozer has a fixed straight-ahead blade curved to give the proper roll to dirt being pushed by the tractor, the manufacturer says. It is 10 feet wide, 4 feet high, and weighs over 3 tons. The blade can be lifted 4 feet above the ground, and digging depth is said to be unlimited.

The angle-blade dozers may be ad-

justed to provide a slanted, pushing drive and rolling action for use in side banking and grading. They are 14 feet wide, 44 inches high, and weigh over 4 tons. Blade lift is said to be 50 inches above the ground, with digging depth unlimited.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 4.



... a dependable air supply for every job

For big construction jobs....

## DAVEY AIR CHIEF 315

On big construction projects everywhere, you'll find Davey Air Chief Model 315's.

Here is a machine that is built, from the drawing boards up, for the roughest service. Every part is of extra heavy construction... from the sturdy chassis and undercarriage to the famous Davey W type air-cooled compressor.

Highest operating efficiency is assured by the same Davey craftsmanship that, in 1922, built the world's first air-cooled portable.

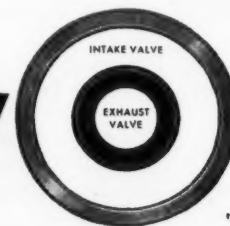
Every Davey is equipped with Permanent Peak Efficiency Valves. Leakproof valve construction plus perfect seating, coupled with special alloy compressor heads, guarantees longer, more economical life. Davey heads provide a ready path for heat removal—three times faster than cast iron.

Air Chiefs are available in 60-105-160-210-315 c.f.m. trailer models... also in "Auto-Airs" for truck mounting.

P & P-121



Air Chief at work in Dravosburg, Pa.



In 1945 these Davey valves were removed for examination for the first time after more than fifteen years' service. In obviously perfect condition and without need of cleaning, they were put back into the machine, are running today.

# DAVEY

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## Construction Costs; Their Recent Trends

**Rise in Highway Costs Analyzed;  
Discussion of Factors Involved and  
Suggestions for Future Stability;  
Contractors Can Help**

+ THIS subject can be covered in a few words which will not be news: construction costs are high and the price-trend curve still points upward.

This summary opened a paper which was presented before the Contractors Division of the American Road Builders' Association at the annual meeting in January, 1948. The speaker was A. C. Clark, Chief of the Division of Construction, Public Roads Administration.

Mr. Clark continued with further summary. During the calendar year 1947, 10,825 highway projects financed with and without Federal funds were contracted for. They amounted to \$905,000,000 and involved 44,918 miles. Contracts awarded on Federal-Aid projects only amounted to \$648,359,000 and involved 19,898 miles of road on 4,745 projects.

### 1946 Efforts to Keep Costs Down

Turning to costs, Mr. Clark reminded his audience that the first serious efforts to keep a reasonable price level were made in 1946—by the Public Roads Administration in cooperation with the state highway departments and contractors. The PRA did not set a price ceiling, he said. But it sought to maintain a level, in relation to 1940 prices, that could be justified. A basic increase in prices was inevitable, due to changing economic conditions. But the PRA insisted that bids in excess of this basic increase should be supported by sound engineering analyses.

Most states made an effort to analyze unit prices and determine how much of the increase was caused by general economic conditions or conditions peculiar to each project. A few outstanding states studied contractors' operations carefully and established sound engineering estimates. And the net result of these control efforts was that 1946 construction costs throughout the country were held at 66 per cent over 1940.

The fact that 21.4 per cent of all low bids received were rejected indicates the states' efforts to keep a proper price level. And in spite of this, the highway program was not unduly delayed, said Mr. Clark—\$518,000,000 worth of work was awarded in 1946.

### Cause of Higher Bids

However, an analysis of bids received in 1946 did show that they included a good deal of cushion to cover unforeseeables. So in April, 1947, the PRA urged states and contractors to hold the 1946 level by reducing this cushion. The policy caused much irritation, Mr. Clark said, and many even claimed it would sabotage the highway program. Still, nearly \$650,000,000

worth of Federal-Aid work was contracted for in 1947, and rejected bids dropped to 15 per cent of the total low bids received.

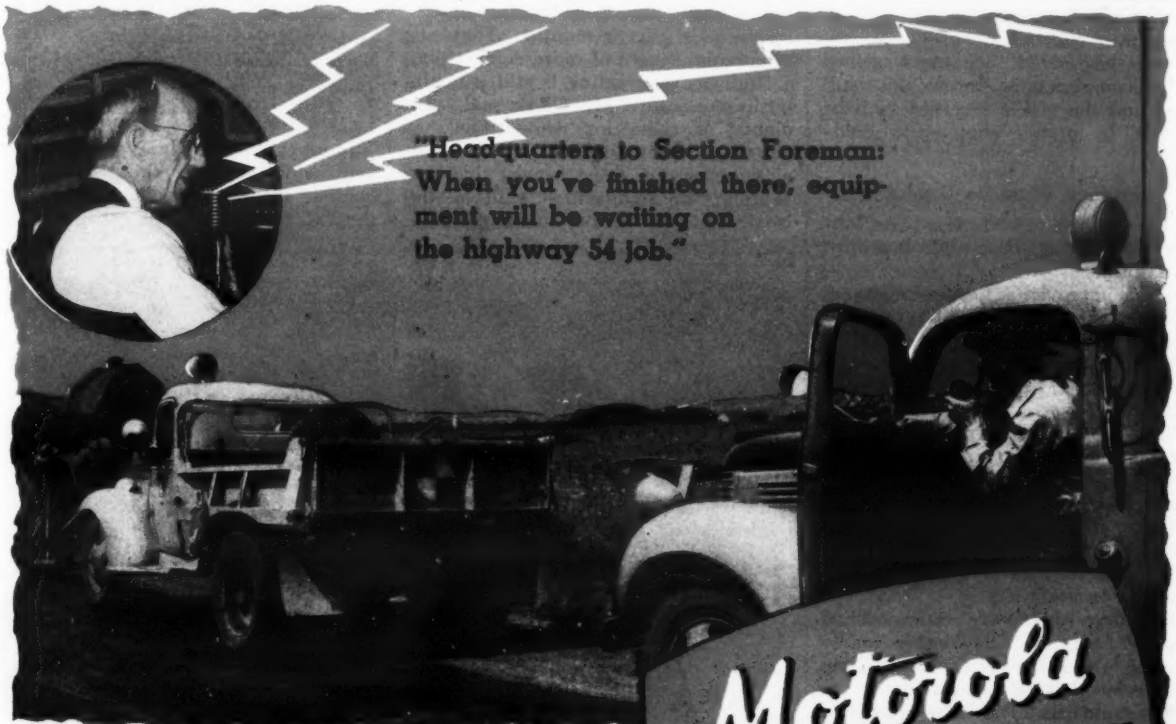
Compared with the 1946 base, the 1947 price index showed an increase of 9 per cent in the first quarter, 12.3 per cent in the second quarter, 16.3 per

cent in the third quarter, and 19.4 per cent in the fourth-quarter. The overall increase for the year was 14.3 per cent. The increase over 1940 was about 90 per cent for the year, although the last quarter's increase was 98 per cent over 1940. (Mr. Clark explained that these percentages are adjusted to pro-

vide for thicker pavements and more exacting design and construction requirements than were in force in 1940.)

But, he pointed out, contract construction costs have risen less than wholesale commodity prices have, as shown by the Bureau of Labor statistics.

(Continued on next page)



**"Headquarters to Section Foreman:  
When you've finished there, equip-  
ment will be waiting on  
the highway 54 job."**

## FAST TALK

**saves money as it SPEEDS ROAD  
CONSTRUCTION AND MAINTENANCE**

You cut down waste motion and "dead" mileage when your section foremen, supervisors and main office are in direct, instant contact with each other for fast action on every phase of your operation. Motorola Radiotelephone gives your main office constant control over every job and enables you to keep constantly informed of work progress, accidents or needed equipment. Motorola Radiotelephone speeds work within a single road crew when it is spread out over miles of highway. So much does Motorola Radiotelephone add to the efficiency of industrial operations that many users report that in savings alone it has paid for itself in one month of operation.

Motorola Radiotelephone has been proved dependable in thousands of installations. It is the four-to-one favorite of police departments across the country. You can prove to yourself the superiority of Motorola Radiotelephone by comparing it with any other communications equipment at any price.

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## Construction Costs: Their Recent Trends

(Continued from preceding page)

And the PRA index for highway construction alone has been consistently less than for all other types of construction. This may be the result of joint efforts to secure full value on all highway contracts awarded. Nevertheless, he added, we must guard against complacency. And we must still insist that the prices received shall be justified by proper engineering analyses.

### Projects Must Be Urgent

At present, the Public Roads Administration is using these main bases for making awards:

1. The improvement must be urgent in character.
2. There must be adequate bidding competition.
3. The unit-bid prices must be justified.

First, as to urgency. It is essential that the more urgent projects be built on a state-wide priority basis. Otherwise less-important projects awarded at higher prices than expected may use up available funds. And the more urgent projects may have to be eliminated from the program.

Of course there are thousands of miles of roads in a deplorable condition due to wartime requirements. They need relocation or reconstruction to higher standards. The same is true of thousands of substandard bridges which are a menace to traffic. Many or all of these projects are urgent. But each state should establish a definite order of priority for these improvements on a state-wide basis; it should not be influenced by local pressure groups.

### Bidding Must Be Competitive

As for adequacy of competition, the PRA is convinced that the contract system based on competition is the most efficient and the most economical, said Mr. Clark.

It is significant that in 1947 only \$5,193,000 worth of work, or less than 1 per cent of the total, was approved for force account on Federal-Aid projects—as compared with 18 per cent on non-Federal-Aid projects reported by states. Also, during the past year there was an average of 3.8 bids per project throughout the country, ranging from 1.2 in New York to 8.2 in Georgia. On 236 projects no bids at all were received.

The number of bids received, however, is not necessarily a criterion of the value of the work, Mr. Clark commented. In normal times bids may vary by as much as 50 per cent or even more between the low bidder and the high bidder. Good operators, if interested in a project, will consistently furnish a reasonable bid, while others are consistently high because they do not operate as efficiently. When the low-bidder group becomes loaded with work, there are only the high-cost operators left.

Moreover, if the so-called good operators expand beyond their normal capacity, they lose personal contact with the work; their management may become less efficient; and they are apt to submit high bids to cover this inefficiency. In normal times, under close competitive bidding, a contractor would face possible loss if he expanded too much. Now, if he expands too much, there is always the temptation to jack the price a bit on later jobs.

Are there enough contractors to keep bidding competitive? Mr. Clark cited these figures in answer. Between 1935 and December 31, 1947, 6,121 contractors worked on Federal-Aid highway construction. From January 1, 1940, to December 31, 1947, only 3,676 contractors were working. This indicates a net mortality of 2,445 contractors or about 40 per cent. Many of these contractors

went into war work and other types of industry. And many of them are reluctant to return to the highway field because of unsettled material, labor, and equipment conditions.

But now 858 new contractors are doing Federal-Aid highway work. And 112 who bid before 1940 have re-entered the field. There are also 250 new contractors who have been bidding unsuccessfully in recent months. They are a potential source of more competition.

Highway contracting is still a small-business venture, Mr. Clark said, with plenty of room for competition. It affords opportunities for many types of work within price ranges that encourage the smallest as well as the largest of contractors to participate.

Federal-Aid contracts reviewed during 1947 ranged from \$177.50 for culvert construction on an Iowa job to \$4,605,885 for the superstructure of the Memphis Bridge. The overall average was \$135,530. Further break-down shows that the most popular-sized contract is in the \$100,000 to \$250,000 bracket:

Contract Size	Per Cent of Total Number	Per Cent of Total Cost
Under \$25,000	27	2
\$25,000-50,000	15	4
\$50,000-100,000	19	10
\$100,000-250,000	24	28
\$250,000-500,000	10	26
\$500,000-1,000,000	4	19
Over \$1,000,000	1	11

It may be, Mr. Clark said, that the contractors now working are overloaded. He cited as evidence the fact that 27 per cent of all going projects

show a rate of progress that is not satisfactory; and in some states the percentage is over 50. But he added that in almost one-third of these projects, the unsatisfactory progress can be attributed to lack of efficiency in the contractors' organization:

Reasons	Per Cent
1. Lack of efficiency in contractors' organization	31
2. Lack of equipment and repairs	18
3. Lack of materials	18
4. Lack of labor	13
5. Weather and miscellaneous causes	18

This poor management can be attributed, in turn, to delays in starting operations and to an inefficient supervisory force. On the whole, he said, it seems to indicate that many contractors

(Continued on next page)

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tors have over-expanded and, as a result, diluted their efficiency.

#### Bid Prices Must Be Justified

The PRA has made no attempt to establish ceiling prices on construction—in spite of unwarranted assertions that it has—said Mr. Clark. Nor has it tried to set a percentage of increase that could be applied to all jobs throughout the country or within any state—any more than it has advised accepting a low bid in all cases regardless of amount. Conditions differ too much to set a definite cost per mile, or a definite price per cubic yard of excavation or of concrete. But it has urged states to determine how large a price increase is justified by changing

economic conditions and by conditions peculiar to each project. It has urged them not to accept a bid or estimate based upon broad general statements that could be made to apply to an increase of any size.

One of these general statements is that the going price, or one a little higher, should establish the value of the work—not an actual determination of the cost plus reasonable allowance for profit and contingencies. Since some contractors bid on the basis of what the traffic will bear, this method of justifying bids is apt to establish a local price level from which there is often an upsurge but seldom a decline, Mr. Clark pointed out.

A few states in their analyses have

computed the value of the work by determining the contractors' probable output, making allowance for contingent factors. However, such an effort was often nullified by this assertion: that the low bidder was an inefficient operator and that his output would be a good deal less than estimated, with a higher unit cost as a result.

Other states have justified bids by correlating them with the amount of competition secured. They argued that if several bids are received, all above the estimate, it would seem that the estimate should be examined closely. If only a few bids are received, all in excess of the estimate, it would appear that the low bid should be analyzed carefully.

But the PRA has always advocated firm engineering estimates in advance of bid openings, Mr. Clark said. And by and large, he added, most state engineers have used a simpler, more practical method of justifying bid prices. First they have determined the basic percentage of increase required over a specific base period. Then they have analyzed cost-increasing conditions on individual jobs—amount of rock in excavation, amount of interference by traffic, extent of haul, probable contingencies, etc.

#### Steps to Control 1948 Costs

It is impossible to predict the effect that changing domestic or international conditions will have on our economy in 1948, said Mr. Clark. We will have to take note of increases brought about by such conditions. But we should also take the following steps to control the cost of our highway program:

1. We should adopt a long-range policy of planning and financing to insure efficient operations by engineers, contractors, and manufacturers.
2. We should select the most urgent projects for early improvement.
3. We should put off projects that involve competing for scarce labor and materials with more important improvements—improvements which contribute more to the national welfare. Though we must not forget, Mr. Clark added, that adequate highways also contribute materially to the national welfare. Moreover, the use of such critical material as lumber on highway work creates almost no competition with the housing program. We used only 0.3 per cent of the total lumber output on Federal-Aid highway work awarded last year.
4. We should proceed with construction contracts on a basis which is in keeping with the available engineers and contractors—and their efficient capabilities.
5. We should establish firm unit prices for the major items of a contract before bids are received.
6. We should do away with the need to gamble or cushion bids because of unforeseeables. We can do this in part with short-term contracts, or contracts limited to the type of work which the available contractors are best fitted to do. For example, several states have obtained good prices on structures by taking bids just for furnishing and fabricating steel—and then, when delivery of material was assured, inviting bids for erection.
7. We should do away with obscure or vague provisions in our specifications, and all uncertainty about the amount and kind of work required.
8. We should do away with unnecessary hand work and encourage the use of new developments in equipment. And specifications should be flexible enough to permit the use of these improved machines.

#### Contractors Can Help

Contractors, on the other hand, should not be complacent or depend on the engineers to introduce cost-saving measures. They should insist upon firm prices for materials and reasonably definite delivery schedules. They should determine the specific effect which increases on certain items will have upon the overall cost of construction, rather than assume an arbitrary increase. Where operations are controlled by organized labor, basic agreements should be reached in advance concerning wages and working conditions—agreements that will not be changed during the life of the contract.

Contractors should encourage and take part in joint conferences with engineers on problems of mutual interest. They should support the state highway departments in their efforts to keep competent engineers by adopting pay scales on a par with positions of equal

(Concluded on next page)

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**IT'S RUGGED AND TOUGH  
BUILT TO OUTPRODUCE AND OUTLAST**

## Construction Costs: Their Recent Trends

(Continued from preceding page)

responsibility in other industries.

Overexpansion which tends to dilute the efficiency of a contractor's organization is to be avoided, and adequate management should be provided on each individual project.

### Forecast for Future

The year 1948 may bring still higher costs. But in the past two years we have surmounted obstacles that looked staggering, and that fact should allay our fears for the future, said Mr. Clark.

The materials market is improving. Delivery of steel and other products takes less time. Accordingly, contractors should insist on deleting escalator clauses for materials. Once vague quotations are done away with, they can eliminate the price cushion from their bids.

The equipment situation is still tight for some items. But it may improve faster than we expect. If it follows the pattern of the period after World War I, there may be significant improvements in the types of equipment. Progressive contractors will be quick to take advantage of these improvements and reduce their costs of performance.

Labor productivity is still a moot question, said Mr. Clark. But apart from tradesmen employed on structures, this problem does not appear to be a serious one in highway construction. The highly mechanized nature of this work, and the chance to recruit younger, more venturesome men, should help insure an adequate supply of skilled labor—provided long-range planning and financing assure reasonably steady employment.

We approach the 1948 construction season with confidence that engineers, contractors, and manufacturers working together will devise ways to offset any uncontrollable factors that may tend to increase construction costs. If our concentrated efforts along this line are successful, Mr. Clark concluded, it is reasonable to assume that the price level during 1948 can at least be maintained at the present basis.

### Gloves for Welding

Chrome-tanned cowhide welding gloves are now available from the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y. They are made from a medium-weight cowhide, and have a one-piece leather back and a wing-type thumb construction. The Style No. 804 gloves can be used for either oxyacetylene or electric-arc welding.

The wing-type thumb is cut to allow maximum thumb action without binding or pulling across the palm. The fabric-lined cuff is said to prevent sagging or crumbling of the cuff section. In addition to these advantages, Air Reduction points out that the seams across the back of the glove have been eliminated to minimize the possibility of cuff separation.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 30.

### Data Sheets on Form Work

A new type of catalog has been made available by the Irvington Form & Tank Corp., 43 Cedar St., New York, N. Y. Data of interest to users of concrete forms have been assembled on looseleaf sheets for insertion in a pocket-size envelope folded to retain them. The sheets are 3 3/4 x 8 3/4 inches in size.

The sheets contain descriptions of the Irvington products and methods, and the advantages claimed for them by the manufacturer. Comparative construction costs for wood and steel foundation forms, descriptions of the various types

of forms, and other information assembled by the Irvington company's engineers are also contained in the sheets. Additional sheets will be made available from time to time.

Copies of this "docket" may be obtained from the company. Or use the enclosed Request Card. Circle No. 79.

### Bidding-Procedure Guide

A "Suggested Guide to Bidding Procedure" has been advanced by a joint committee of the American Institute of Architects and The Associated General Contractors of America, Inc. It is designed for use in private construction when competitive lump-sum bids are requested. It is also applicable in public work so far as requirements of public authorities permit.

This suggested guide was presented at the 29th Annual Convention of the AGC in Dallas, Texas, where the group approved and recommended it for acceptance and use by members of the association.

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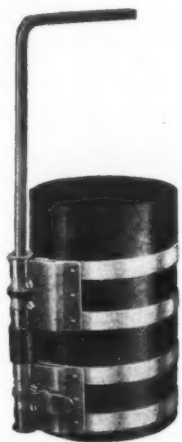
If you don't believe that Naturalube D.H.D. is the best oil you have ever used, Lion Oil Company will give you your money back!

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Owatonna's new ring compressor, the No. 850-T, is designed especially for large truck pistons. It handles all the piston rings at once and is ratchet-controlled.

### New Ring Compressor

A ring compressor designed to handle rings for large truck pistons has been announced by the Owatonna Tool Co., 348 Cedar St., Owatonna, Minn. It is designed to handle all the piston rings at one time, including the ring in the piston skirt.

The No. 850-T ring compressor is 6½ inches long, has a double clamp, and four compression hands operated by an L-shaped handle. It is ratchet-controlled. The manufacturer explains that tension can be held constant, and, when desired, it can be quickly released by depressing the ratchet pawl.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 36.

### Tandem-Roller Catalog

A catalog describing its 3 to 5-ton tandem roller is being distributed by The Galion Iron Works & Mfg. Co., Galion, Ohio. This 8-page catalog has been prepared in order to give complete information on the machine—its features, construction, and uses.

Catalog No. 305 describes with text and pictures the featured parts of the machine: the compression roll, the 2-section steering roll, the frame, operating controls, transmission, final drive, and the 25-hp Wisconsin gasoline engine. The final page lists the specifications of the machine.

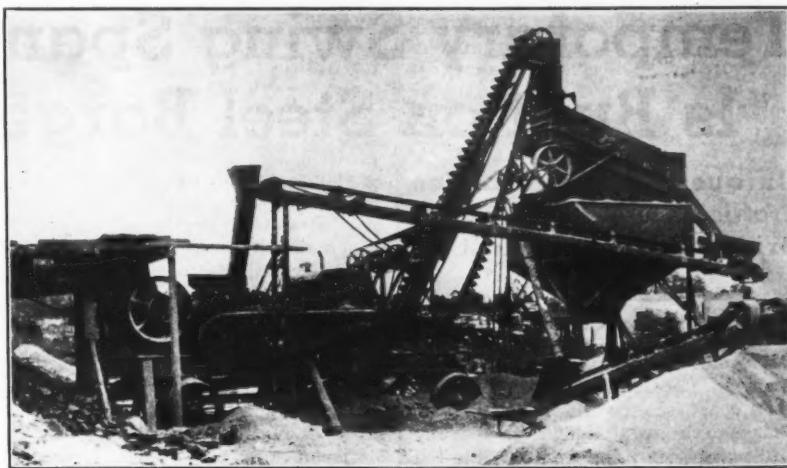
Copies of this literature may be ob-

tained from the company. Or use the enclosed Request Card. Circle No. 54.

### Crushing, Screening Plant Semi-Portable

A semi-portable crushing and screening plant has been added to its line by the Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. Known as the No. 145R, it is described as a duplex plant having a No. 1524 jaw crusher and a 30 x 18 roll crusher, together with a folding bucket elevator and a power unit—all mounted on a structural-steel chassis with steel wheels. Pneumatic tires are optional equipment.

Additional units include a 3-deck 3 x 10-foot vibrating screen mounted on a 20-cubic-yard 3-compartment steel storage bin. A return conveyor runs from the screen to the roll crusher. For moving, the bucket elevator can be folded over the crusher units and the screen; bin and return ele-



The new Pioneer 145R crushing and screening plant is mounted on a structural-steel chassis with steel wheels for portability. Pneumatic tires are optional

vator can be loaded onto trucks. The plant is rated at a normal capacity of 40 to 50 tons per hour of three sizes of material. The hopper-fed primary

crusher will take rock up to 12 inches. Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 11.

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# Temporary Swing Span Is Built on Steel Barge

**Unique Structure Carries Traffic While New Bascule Bridge Is Being Built at Lake-Port City**

CHARLEVOIX, Mich., is generally considered to have the most scenic and best protected natural harbor on Lake Michigan. Located far up on the north-west coast of the Lower Peninsula, Charlevoix is a well known summer resort, and also a port of call for the big Great Lakes cruise steamers. The harbor is reached by sailing up Pine River  $\frac{1}{4}$  mile from Lake Michigan into the deep waters of Round Lake. But Pine River was not always navigable. To make it so, the Federal government widened and deepened its channel, constructed concrete revetment walls along the sides, and erected a lighthouse at the lake end as a guide to mariners. Over its short length the river carries a steady flow of ship traffic, with vessels entering and leaving the sheltered harbor, or continuing beyond Round Lake farther inland to the larger Lake Charlevoix.

In Charlevoix city, U. S. 31 crosses Pine River with a heavy stream of vehicular traffic, especially in the summer when this region of lakes and forests attracts so many tourists. The 50-year-old swing bridge crossing the river on U. S. 31 is now being replaced by a modern double-leaf bascule span with a 44-foot roadway and designed for H-20 loading. The former structure had but a 19-foot roadway, and was posted for a load of only 5 tons. Its narrow width and slow operating speed in opening and closing the swing span created long traffic jams through the streets of the lake-port city.

The Michigan State Highway Department, with Charles M. Ziegler, State Highway Commissioner, awarded a contract for the construction of the bridge substructure and the concrete portions of the superstructure to two contracting firms: the L. W. Lamb Co. of Holland, Mich., and the Luedtke Engineering Co. of Frankfort, Mich. Their joint low bid was \$697,980.70. A contract for fabricating and erecting the structural-steel superstructure for the bascule span was awarded separately to the Mount Vernon Bridge Co. of Mt. Vernon, Ohio, on its low bid of \$270,433.40. The major item in the latter contract is for 797,000 pounds of structural steel. Work on the project started May 30, 1947, and is scheduled to be completed next September.

## Old and New Spans on Same Site

The former bridge had a 172-foot through steel-truss swing span which pivoted on a circular concrete pier supported on timber piles. At its south end the span sat on a concrete rest pier, supported in the river on timber piles. From this latter pier a 31-foot-deck approach span continued back to the concrete south abutment. The north end of the swing span rested on the north abutment, also built of concrete. The roadway and 7-foot sidewalks on both sides were wooden planks. Between the protecting fender piles, the clear opening for navigation was 71.8 feet.

The new double-leaf bascule span will be supported on concrete piers, 100 feet apart, to provide a 90-foot clear channel for navigation between the fender piles. Both piers rest on steel H-beam piles. With the bascule leaves in the down position, the vertical clearance will be 16 feet 10½ inches. Running back on each side from the bascule section are 40-foot 10½-inch rolled-beam approach spans; these connect with the reinforced-concrete abutments which

are supported on treated-timber piles. The 44-foot clear roadway will consist of a structural-steel grid flanked on either side by a 6-foot sidewalk. The total length of the project is 0.17 mile which includes the grading, drainage, and concrete paving of the approaches.

## Temporary Bridge

The contract called for the removal of the existing structure since the new bridge is built on the same line as the old span. Consequently a temporary bridge to carry U. S. 31 traffic had to be constructed before the demolition of the old span or the construction of the new one could begin. Because of the heavy river traffic, the temporary structure had to be built with a movable span which could be opened and closed



C. & E. M. Photo

This is E. B. "Duke" Luedtke, President of the Luedtke Engineering Co. of Frankfort, Michigan, one of the joint-venture contractors for the new Charlevoix bridge.

quickly to prevent traffic jams in down-

town Charlevoix. A unique structure to satisfy these conditions was built by the contractors at a cost of \$130,000; this price was part of their total bid.

The temporary structure has a total length of 592 feet. It is made up of timber-trestle approach spans on both sides and a temporary steel bridge over the channel, one end of which floats on a movable barge. The temporary bridge consists of two riveted trusses 120 feet long and 18 feet 2 inches high, set 23 feet apart on center. The steel for this bridge was fabricated by the Christy Corp., shipbuilder, in its yard at Sturgeon Bay, Wis., on the western shore of Lake Michigan. Erection was also by the Christy Corp. aboard a scow at its yards. The bridge was then towed across Lake Michigan to Charlevoix.

When this bridge is closed, the north end of the truss rests on a double timber-pile bent from which it pivots around a ball-and-socket joint at the east or fixed end when it is opened. Then the northwest corner of the span

(Continued on next page)

## 7 Reasons WHY DUMPTOR Maintenance Cost Stays Low in Toughest Service



The hauling unit built by a shovel manufacturer for work with shovels.

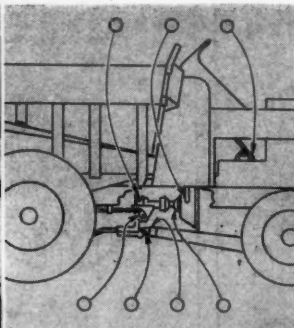
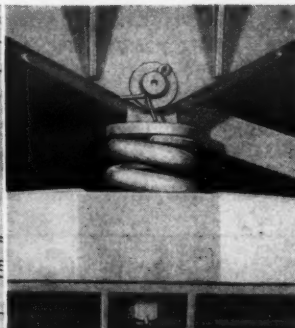
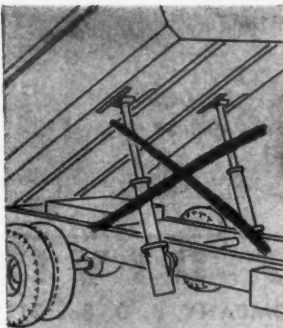
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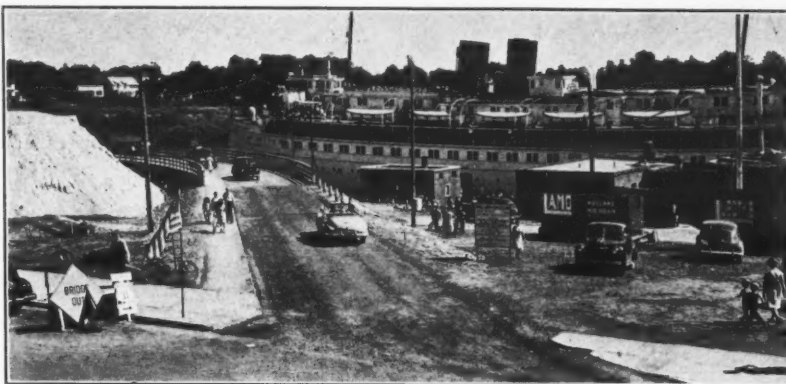


# KOEHRING CO.

MILWAUKEE 10, WISCONSIN

swings on a track supported on a double row of piling. At the other end, the truss span rests on four steel posts rising from a floating barge. The barge was also built by the Christy Corp. at Sturgeon Bay, Wis., and towed to Charlevoix. It has three compartments, each 16 x 28 feet, so that its total dimensions are 54 x 28 x 12 feet deep. It is of welded construction with 5/16-inch side plates and 1/4-inch top plates.

At one end of the barge is the machinery and operating house which contains an American 2-drum hoist, run by a 40-hp electric motor on power supplied by a cable connecting to a shore line. A 3/8-inch wire cable, capable of withstanding a 10,000-pound pull, passes through the hoist and is fastened at either end to a pile clump east and west of the bridge along the north shore of the river. By means of the hoist and cable, which has a line speed of 100 feet per minute, the bridge is quickly opened and closed as it swings on the floating barge while pivoting around the fixed northeast corner.



C. & E. M. Photo

You're looking at the south approach to the temporary bridge across the Pine River at Charlevoix. That's the North American cruise steamer of the Chicago, Duluth & Georgian Bay Transportation Co. tied up at the dock.

#### Operating the Span

To balance the weight of the operating machinery at one end of the barge, the other end was loaded with pig iron to keep the craft on an even keel. The center compartment of the barge was

flooded with water so that the bridge span would seat on the south timber abutment. At the signal of a boat wanting the bridge opened, the water is pumped out with a Fairbanks-Morse 8-inch pump. This pump is located in the

deck house, while on the deck a Gorman-Rupp 3-inch pump is held in reserve. As the water is pumped out, the truss span is raised out of the slot in which it was seated at the south abutment so that it can swing on the floating barge. Pivoting on the cast-steel bearing at the northeast corner, the truss span is pulled back by the cable and hoist and tied to a pile cluster along the north shore of the river just east of the bridge. In this way a 75-foot clear channel is provided to navigation.

When the boat has passed, the span is pulled back into position by the hoist and cable. The sea cocks on the barge are opened, and the compartments flooded sufficiently so that the span can settle down into the slot forming the bridge seat at the south timber abutment. The cable is then slacked off and dropped to the bottom of the river so as not to interfere with the passage of small boats that do not require the opening of the draw span.

#### Trestle Bents

Besides the 123-foot swinging truss, the temporary bridge includes twelve 15-foot timber-trestle spans on the south side, and seventeen 17-foot timber-trestle spans on the north side. Beyond the trestles are approach fills of 165 and 186 feet on the south and north sides respectively; these curve back into U. S. 31, just west of the temporary bridge.

On land the timber bents consist of four 12 x 12 posts on 7-foot centers, with the two inside posts plumb, and the two outside posts on a batter of 2 inches in 12. They were set on 12 x 12 mud sills and were capped with 12 x 12's, 28 feet long. Cross-bracing was done with 3 x 10's across the bents. Longitudinally every other bent span was cross-braced on the outside with 3 x 10's. Across the caps eleven 4 x 18 stringers were laid to support the 4 x 12 floor planks providing a 20-foot roadway and a 5-foot sidewalk on the west side.

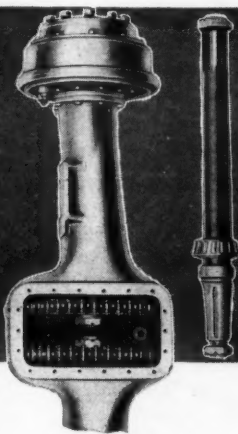
The double bents which make up the abutments for the temporary bridge are in the river, and consist of Douglas fir piles brought on from the West Coast. They are 50 to 65 feet long with 16-inch butts and tips from 6 to 9 1/2 inches. The track, on which moves the 2-wheel cast-steel carriage frame for swinging the truss span, is supported on a double row of piles. The track is 45 feet long measured on the arc, and has a 23-foot radius swung from the pivoting or northeast corner of the north abutment.

#### Work From Floating Rig

The temporary steel truss was lifted in place and the piles were driven from the contractor's No. 10 rig, a big scow equipped with a steam crane. The all-steel scow measures 130 x 40 x 9 feet deep. Permanently fastened to the deck at the stern is an Orton coal-burning steam crane with an 85-foot boom to which an extension was added, giving it a length of 110 feet. The crane has a lifting capacity of 45 tons at a 20-foot radius. In a slot at the center of the bow, so that it can trail, is a spud; two other spuds are located at both ends of the stern within the hull. The steel spuds are 40 feet long and 26 inches square. They were made by building up plates around 18-inch pipe. If necessary, the No. 10 uses 65-foot spuds, but on this job the shorter length sufficed. In this fairly calm working area only two spuds were necessary, one forward and one aft. They are raised or lowered by Lidgerwood steam deck engines, with the steam supplied by the crane boiler. Steam is piped to the deck engines through the hollow center pin of an Orton crane.

The piling for the temporary bridge was driven by a Vulcan No. 0 hammer. Other equipment aboard the No. 10 included a Hobart 250-amp electric welder, and a Schramm 240-cfm air compressor.

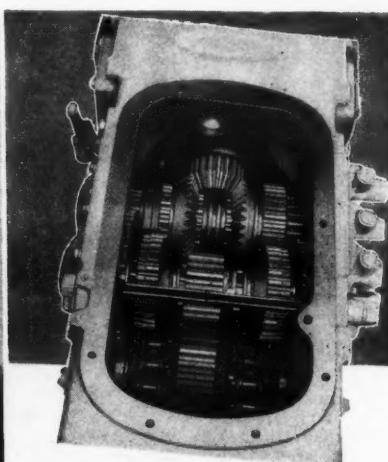
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**5** No Dumptor drive axle has ever been broken in rock. They're chrome nickel steel, 4" in diameter, in heavy cast steel case.



**6** Kickout pan adds 3/16" steel on top of 3-layer steel-oak-steel bottom. Body sides heavily reinforced with 4" steel channels.



**7** Transmission runs in oil . . . lasts longer. Oil changed only once a season. No need for continuous refilling. Case is oil-tight.

**New 3 1/2-5  
End Discharge Mixer  
Saves Labor**

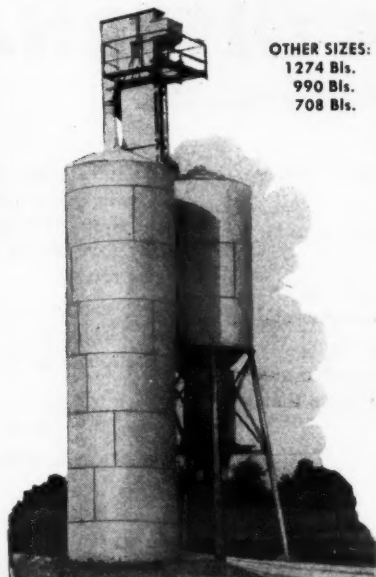
**Stores up to  
1,550 Barrels Cement  
Yet Fully Portable**

**Sliding Boom  
Eliminates  
Costly Handwork**

#### Johnson Twin Silo Bulk Cement Plant

Combines large storage capacity — up to 1,550 barrels of cement for the largest size — with complete portability. All-welded construction simplifies erection.

OTHER SIZES:  
1274 Bbls.  
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#### Parsons 250 Trenchliner

Sliding boom permits Parsons 250 Trenchliner to sidestep obstructions — walls, trees, telephone poles — that would stop other trenchers. Costly handwork is eliminated. Boom slides easily from side to side across full width of Trenchliner, because it rides on large diameter rollers.

**PARSONS  
COMPANY  
NEWTON, IOWA**



#### New Kwik-Mix Dandie

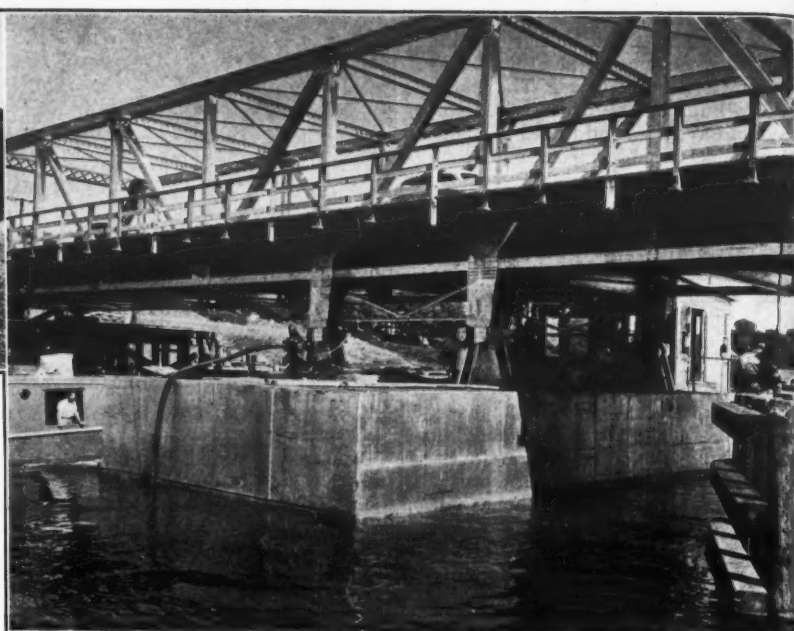
Dandie quality in every detail. Modern high strength welded construction. Thorough mixing action. End discharge saves labor . . . you don't back and turn loaded barrow. Approach mixer from either side or front. Spotting area unobstructed. Trails fast, safely, because it rides on leaf springs.

**KWIK-MIX  
COMPANY  
PORT WASHINGTON, WISCONSIN**



C. &amp; E. M. Photos

The temporary bridge across the Pine River at Charlevoix was built with a movable span to accommodate heavy river traffic. As you can see in the picture above, one end floats on a movable barge; the other swings on a track supported on a double row of piling. The picture at the right is a close-up of the floating barge with the machinery and operating houses at one end.



## Temporary Swing Span Is Built on Steel Barge

(Continued from preceding page)

Other floating equipment included the 63-foot steel tug Karl E. Luedtke, powered by a Kahlenberg 300-hp heavy-duty diesel engine; and the two 26-foot steel open launches. The launch Homer is driven by a 90-hp Gray Marine gas engine, and the launch Duke by a 120-hp Gray Marine gas engine. The launches were used for towing inside the harbor.

At first, the tug Karl E. Luedtke did the lake towing. Later it was sent to St. Joseph, Mich., to tow steamboats in and out of that harbor to prevent damage to the cofferdams of another Michigan Highway Department bridge under construction. It was replaced on this job by the tug Erich R. Luedtke. The Erich R. Luedtke is a 45-foot steel tug powered by a Kahlenberg 120-hp heavy-duty diesel engine. The tug Erich was built by the Manitowoc Shipbuilding Co. of Manitowoc, Wis., one of the two shipyards which built our World War II submarine fleet.

Three other scows were also on the job. A wooden dump scow, 110 x 32 x 12 feet deep, with a capacity of 300 cubic yards in its 6 pockets, was used to dispose of the material excavated from the pier cofferdams. A 110 x 34 x 9-foot-deep scow with a capacity of 500 tons—which first transported the temporary bridge from Sturgeon Bay—also served to carry the steel sheet piling used in the construction of the cofferdams and the steel bearing piles used in the construction of the piers. A smaller wooden scow, 80 x 35 x 7 feet deep, was equipped with an Orton steam crane having a 50-foot boom, and drove some of the timber piles with a McKiernan-Terry 9B2 hammer.

### Work on New Bridge

When the temporary bridge was completed and opened to traffic on August 24, 1947, the old bridge was quickly dismantled. The rivets in the old truss were driven out, and the No. 10 scow lifted the steel down in two sections for salvage. Then the old circular concrete pier and abutments were battered down with a ball weight swung from the crane boom on the scow. Lastly the timber supporting piles were pulled out by the crane, leaving the channel clear and unobstructed.

Materials for the construction were shipped to the siding nearest the job site—that of the Pere Marquette Railway, about ½ mile from the bridge. They were hauled to the job on a Federal truck and pole trailer. The steel H-beam piles and caps were purchased in advance by the Michigan State Highway Department in order to speed up the work. All other materials were furnished by the contractors, including the 200,000 lbm of timber required for the trestle, and the 526 tons of steel sheet piling (Section MZ-38) required for the cofferdams. The steel was purchased from the Carnegie-Illinois Steel Corp.

and shipped from its plant at Munhall, Pa.

Work on the pier cofferdams started around the middle of September, 1947.

(Continued on next page)

# YES



## CONSTRUCTION MEN

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# INTERNATIONAL Trucks

The south pier is located in deep water at the edge of the river from which the bank rises abruptly. On top of this hill was the 3-story Alhambra Hotel which was purchased by the State and demolished since it was a hazard to construction. Excavation for the south cofferdam would almost certainly have caused settlement in the structure, if not complete collapse.

#### Sheet Pile Cofferdams

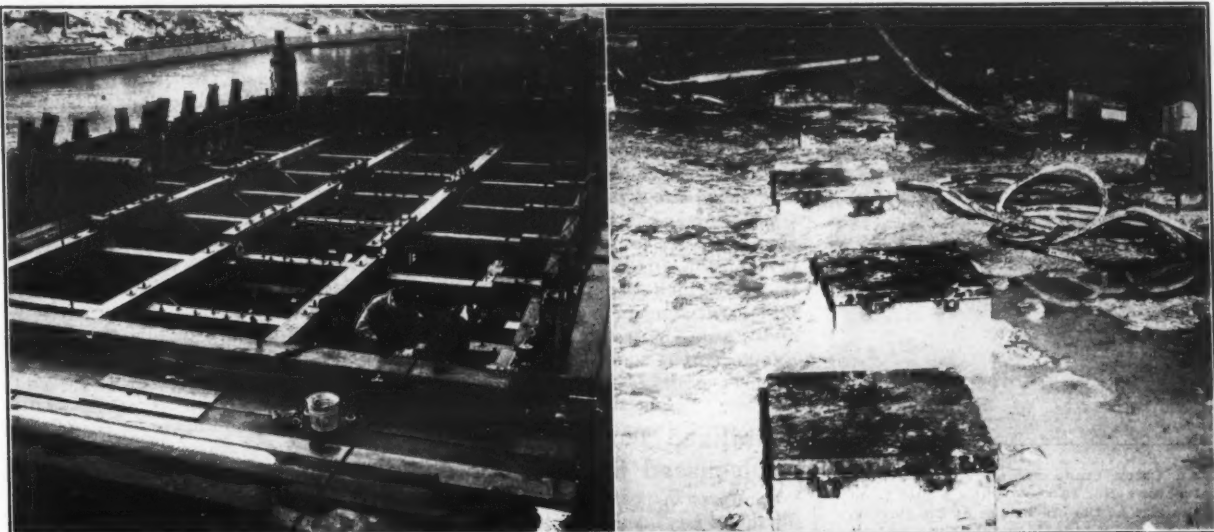
A cofferdam, 77 feet x 42 feet 6 inches, was built for the south pier using MZ-38 steel sheet piles 67 feet 6 inches long. The tops of the piles are at elevation 584.0 with a water elevation of 581.0. This length of piling was necessary to permit the cofferdam to be excavated to elevation 543.0, 38 feet below the surface of the water, and still leave the piles with sufficient penetration to prevent "kicking in" at the bottom. Except at the surface, no bracing inside the cofferdam was possible until three rows of H-piles driven on a batter were in place. This meant designing a cofferdam that would be free of bracing until after it had been excavated and the H-piles had been driven. The problem was further complicated by a highly unbalanced load against the cofferdam—the main street of Charlevoix is 18 feet above the water surface on the one side, and on the other side of the cofferdam the water is 24 feet deep.

The cofferdam problem was met by handling the wall on the street side as a dock wall. Eighty feet back, beyond the angle of repose of the earth, a row of timber anchor piles was driven. At the rear of the timber piles, 12 x 12 timbers were secured. Similar 12 x 12 timbers were bolted to the steel sheet piling of the cofferdam wall. The steel sheet pile wall was then tied to the timber anchorage with 1½-inch tie rods, over 80 feet long, going through every other sheet pile. The cofferdam design was by A. S. Hoff of the Luedtke organization.

The sheeting was driven from the No. 10 rig, and the cofferdam was excavated by a Blaw-Knox 3-yard clam-shell bucket. The material was deposited in the dump scow which was towed out in the lake and emptied. Then the 14-inch 73-pound H-beam steel bearing piles, 41 feet long, were driven by a McKiernan-Terry 10B3 steam hammer to elevation 553.0, 28 feet below the surface. A 37-ton bearing under the ENR formula was required. Compressed air was used to keep the hammer clear during the underwater driving. No jetting was required.

The south pier is somewhat larger than the north pier because it contains the bridge-operator's house. It is 75 feet 8 inches x 41 feet 6 inches, and is supported on 190 piles. Ten fewer piles were required at the north pier which measures 69 feet 9 inches x 41 feet 6 inches. The piles project through 8 feet of tremie-seal concrete at the bottom of the cofferdams, and into the footings 6 inches. The bottom of the concrete seal is at elevation 543.5, and the top is 551.5.

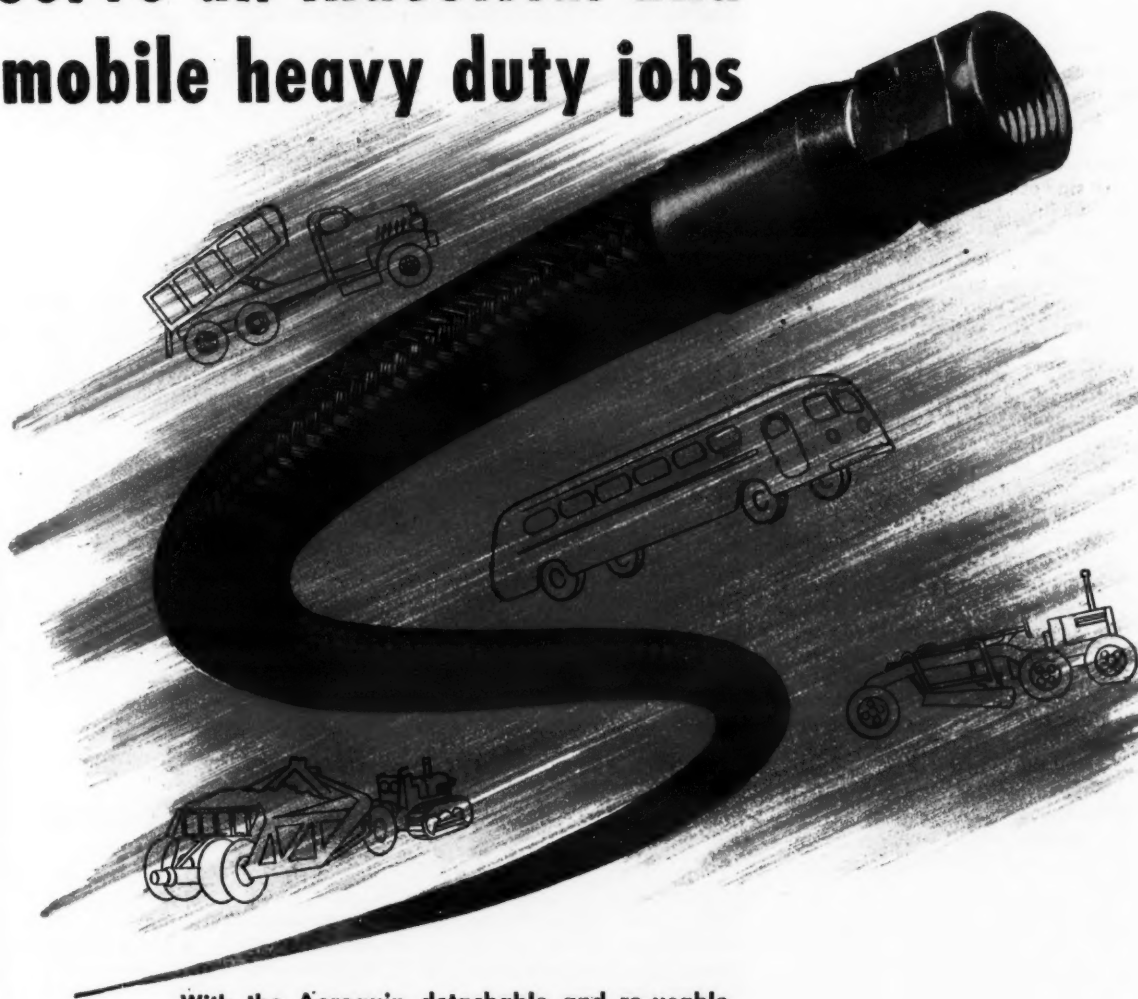
Bracing within the cofferdam consisted of three sets of wales at elevations 559.0, 567.5, and 579. Mean low water in the river is 578.5, but as previously mentioned the water was at elevation 581.0. The wales were built of



two 8 x 16's bolted together. The other timber used consisted of 12 x 12 horizontal (Concluded on next page)

Michigan Highway Dept. Photos  
Here are two views of the north cofferdam built for the new double-leaf bascule bridge at Charlevoix, Mich. The picture at left shows the bracing in place in preparation for the pour. The picture at right shows the H-beam piles projecting through 8 feet of tremie-seal concrete. They have been capped with steel bearing plates.

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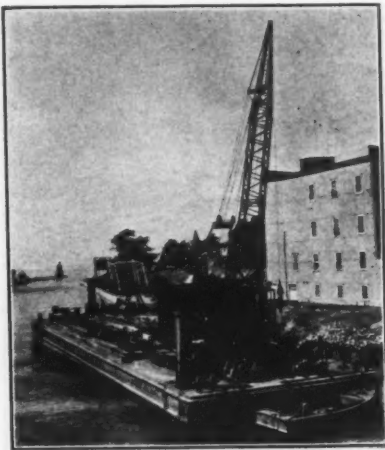
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#### ROAD SIGNS AUTOMATIC TYPE

3 ft. or 4 ft. furnished complete with sign and 2 red flags. Beside the sign illustrated therewith we supply wording as follows: "Danger," "Danger Men Working," "Men Working Above." Also have other types.



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C. &amp; E. M. Photo

An Orton crane mounted on the contractor's No. 10 scow pulls a pile from the site of the old bridge at Charlevoix. The new bridge is being built on the same line as the old span.

## Temporary Swing Span Is Built on Steel Barge

(Continued from preceding page)

zontal struts, 12 x 12 posts, and 4 x 12 cross-bracing all securely bolted with 1-inch bolts and 1 1/4-inch tie rods. The bracing was built on shore before the cofferdam was completed. It was so well built that after the tremie seal was poured, it was picked up in two units by the No. 10 rig and placed in the cofferdam without racking. Some 50,000 lbm of timber went into the south cofferdam bracing.

### Concreting

A concrete batch plant was set up on the south side of the river with a Butler 250-barrel bin for the cement, and a Butler 50-yard aggregate bin for the sand and stone. Petoskey portland cement was delivered in bulk by trucks to the bin from the plant at Petoskey, 17 miles distant. The aggregate was delivered by self-unloading steamboats directly to the batch plant at the edge of the harbor. The stone came from the Drummond Dolomite Co. at Port Detroit, Mich., on St. Mary's River just below the Soo locks. The sand, manufactured from stone, was supplied by the Inland Lime & Stone Co. at Port Inland, Mich., on the Lake Michigan shore of the Upper Peninsula.

Three batch trucks hauled the batches to MultiFoote 27-E pavers which were set up on both sides of the river. Water for the mix came from city fire hydrants. The mixed concrete was discharged into Blaw-Knox 1 1/2-yard buckets which were handled by Northwest cranes with 60-foot booms, one working with each paver. During the pouring of the tremie seal, which was about 900 yards in each cofferdam, the concrete was emptied from the bucket into 10-inch tremie pipe going down to the bottom of the cofferdam.

The two concrete abutments rest on treated-timber piles. The elevation of the top of the concrete roadway on the finished bridge is 599.0. When the new bridge is completed, the temporary bridge will be dismantled. The steel truss then becomes the property of the State, but the contractor keeps the timber.

### Quantities and Personnel

The major items in the contract include the following:

Excavation	10,920 cu. yds.
Steel sheet piling to remain	7,559 sq. ft.
Steel H-piles	14,430 lin. ft.
Treated-timber piles	6,492 lin. ft.
Tremie concrete	1,772 cu. yds.
Other concrete	7,163 cu. yds.
Steel reinforcing	168,210 lbs.
Concrete pavement, 8-inch	5,870 sq. yds.

An average force of 50 men is employed by the two contractors. The temporary trestle, removal of the old bridge, excavation, pile driving, and cofferdam construction are being done by the Luedtke Engineering Co. under the supervision of Roscoe "Mike"

Bauer, Superintendent. The temporary approaches, all concrete work, and permanent approaches are being done by the L. W. Lamb Co., under the supervision of Gene Fewell, who is part owner of the company.

For the Michigan State Highway Department, N. F. McKinney is Resident Engineer. The department is headed by Charles M. Ziegler, Commissioner, with G. M. Foster, Bridge Engineer. The bridge project is located in the 3rd District of which Lee D. Zimmerman is District Engineer for road construction, and H. J. Conroy is District Bridge Engineer. The consulting engineers are Hazlet & Erdal of Chicago.

## Stabilized Turf Shoulders Discussed in HRB Booklet

Reference material on stabilized turf shoulders has been assembled in booklet form by the Highway Research Board's Subcommittee on Shoulders. It is intended to aid those conducting experimental work on the subject, and to

interest others in this field of highway and airport design. The booklet was prepared by Frank H. Brant, Landscape Engineer, North Carolina State Highway and Public Works Commission, and by Harry H. Iurka, Landscape Architect, District No. 10, New York State Department of Public Works.

It discusses reports on the design of stabilized soil shoulders for turf cover; how to grow grasses under existing and "made" roadside conditions; stabilized shoulders which will support vegetation; maintenance of turf shoulders; a progress report on stabilized turf shoulders constructed on Long Island; a preliminary report on experimental stabilized turf shoulders for New Jersey parkways; a progress report on a study of turf growth on soil mixtures available for highway shoulder construction in Michigan; and development of turf on stabilized soils.

Four of these papers were presented at the Roadside Development Committee sessions of the 1947 Annual Meeting

of the Highway Research Board. Each report is accompanied, where practical, with charts, diagrams, and other drawings which amplify the text.

Copies of this literature may be obtained by writing to the Highway Research Board, 2101 Constitution Ave., Washington, D. C. The price is \$1.00 per copy.

### New Sales Executive.

**Central Office for Le Roi**  
John E. Heuser has been named Assistant Sales Manager of the Le Roi Co., Milwaukee, Wis. He will take over many of the duties of Cecil W. Brown, who recently resigned as General Sales Manager.

A Central District Sales Office has been established by the company at 6619 W. Mitchell St., Milwaukee, Wis. Its staff will cover the territory of Ohio, Michigan, Indiana, Illinois, Wisconsin, Iowa, Nebraska, North and South Dakota, Minnesota, Ontario, and Manitoba. Norman M. Sedgwick has been appointed Manager of the new district.

# NEW UTILITY



## Completely Portable Plant Has Capacity in 60 t. p. h. Range . . . . . Produces All Types of Mixes

Here is the industry's most advanced Bituminous Mixing Plant . . . completely portable, built for maximum simplicity in erection and operation, and precise control of measurement and proportioning of aggregate and bitumen. The new Utility Mixing Plant minimizes the time required for setting up or dismantling; its three basic units tow behind ordinary trucks or tractors—and it has the versatility to produce all types of mixes, including the highest types.

Many new basic improvements in design include the unique 845 Mixer with two-bin Gradation Control Unit combined on a single chassis. An auxiliary two-bin Gradation Unit is optional where three or four-aggregate mixes are required . . . you can get the exact plant your mix requires—with a capacity that meets the broadest range of your jobs. In every way the 845 Utility Plant climaxes years of achievement by Barber-Greene engineers in the development of Bituminous Mixing Equipment that makes the most of men, money and materials.

### UTILITY PLANT HAS BASIC ADVANTAGES

- ★ True portability
- ★ Faster erection—no cribbing necessary
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- ★ Two, three or four-bin aggregate gradation
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- ★ Four-cyclone Dust Collector
- ★ Lowest maintenance cost per yard produced
- ★ Ask your Barber-Greene distributor or write for full information.

# Barber-Greene

AURORA ILLINOIS

## Mixer, Paver, Pump Standards Changed

Several changes in standards for concrete mixers and for contractors' pumps have been announced by the Mixer Manufacturers Bureau and the Contractors Pump Bureau. The changes were approved at the 29th Annual Convention of the Associated General Contractors of America, Inc., held in Dallas, Texas.

Changes in the concrete-mixer standards, 18th revision, were effected to indicate more clearly that the size numbers represent nominal capacities and that the guaranteed capacity is what governs. No changes will result in sizes, capacities, or standard rating plates attached to the machines. Paragraph 2 now reads: "The size of a construction mixer shall be designated by a number which shall be the nominal capacity of the mixer in cubic feet of mixed concrete. The letter 'S' shall be placed after the number, and may be followed by any private codes or symbols of the manufacturers in their literature."

literature."

Paragraph 3 now states: "The guaranteed capacities of construction mixers shall be the nominal capacity plus 10 per cent. Construction mixers shall hold and properly mix their guaranteed capacities when operated in level position."

Paragraph 13 now reads: "The size of a paving mixer shall be designated by a number which shall be the nominal capacity of the paver in cubic feet of mixed concrete. The letter 'E' shall be placed after the number and may be followed by any private codes or symbols of the manufacturers in their literature." Paragraph 14 now reads: "The guaranteed capacities of paving mixers shall be the nominal capacity plus 10 per cent. Paving mixers shall hold and properly mix their guaranteed capacities when operating on a maximum grade of 6 per cent."

Changes in the contractors' pump standards, 4th revision, will increase the capacity of certain of the standard self-priming centrifugal pumps, provide

a better range of engine sizes, and improve the line of standard self-priming centrifugal pumps as a whole. The changes were made as the result of exhaustive research by the Technical Committee of the Contractors Pump Bureau.

Examples of upward revisions in the capacity tables for certain standard self-priming centrifugal pumps are that: at a 70-foot dynamic head the 10M pump, formerly rated at 20 gpm, will now be guaranteed at 85 gpm; the 15M will be guaranteed for 110 gpm instead of 65; the 20M pump at 160 gpm in place of 105; and the 30M will be guaranteed for 415 gpm instead of 325.

## Fassas Joins Penn Drake

D. A. "Red" Fassas has joined the sales force of the Pennsylvania Refining Co., Cleveland, Ohio, and will handle accounts in Kentucky and southern Ohio. The company makes Penn Drake Gumout—a solvent for cleaning carburetors and fuel systems.



The new Hydradozer straight and angle-blade dozers, built to fit large crawler tractors, feature a front-mounted closed-type hydraulic system with pump, control valve, and reservoir in one unit.

## New Hydraulic Dozers For Crawler Tractors

A line of hydraulic straight and angle-blade dozers is made by the Pacific Car & Foundry Co., Renton, Wash. Feature of the Hydradozer is its front-mounted closed-type hydraulic system in which pump, control valve, and reservoir are combined in one unit. It has a push-pull cable control said to eliminate control rods and linkage and to make for handier operation.

The Carco moldboard adjustments are designed to give quick change to cut or tilt on both angle and straight-blade models. Changes are made by resetting a single pin in back of each top corner of the moldboard. Maximum tilt is 18 inches from the horizontal. The angle of cut or pitch has a 10-degree adjustment each way from the normal. The moldboard has a three-piece reversible cutting edge, whose centerpiece is made of a tough alloy steel. End bits are made of heavy manganese steel.

The two-way side-frame trunnion has a large bearing surface, and is said to take up side-frame twist and to hold the moldboard tilt solidly. Side frames are attached to the moldboard by two frame pins, and at each side by a tilt-adjusting stub, sleeve, and pin. The steel cylinders are mounted on a universal trunnion bracket designed to permit free movement and self-alignment of the cylinders without bending or scoring the piston rods.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 14.

## Protective Coating

A new protective coating has been developed by the State Chemical Corp., 1265 Broadway, New York 1, N. Y. Permacote provides a transparent liquid coating on metal, wood, and other surfaces, designed to protect them from moisture, alkalis, acids, alcohol, dust, etc.

It is applied by brush, spray, or by dipping. The manufacturer states that it is resistant to heat or cold, and will not crack or chip. It can be applied over regular paints and varnishes, and is said to seal these surfaces against physical and chemical action. The liquid is available in 1 and 5-gallon cans, and in 50-gallon steel drums.

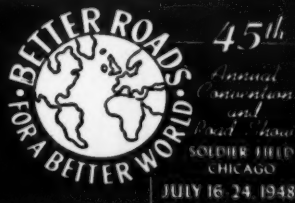
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 18.

## Concrete Institute President

Robert F. Blanks was elected President of the American Concrete Institute at its annual convention held in Denver, Colo., in February. Mr. Blanks is Chief of Research and Geology for the Bureau of Reclamation at Denver. He succeeds Stanton Walker of Washington, D. C., who is Director of Engineering for the National Sand & Gravel Association.

# BITUMINOUS PLANT

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**... NEW EASE IN ERECTION!**



## NEW PORTABLE 845 MIXER-GRADATION UNIT

For precision volumetric measuring, proportioning and mixing of aggregate and bitumen.

## NEW PORTABLE 835 DRYER

With built-in Reciprocating Feeder and High Discharge Elevator which eliminates the need for a hot elevator pit.

## NEW PORTABLE 852 DUST COLLECTOR

Four-cyclone type: contains power unit for Dryer, Cold Elevator, Feeder, Hot Elevator, Screens, Dust Collector, Exhaust Fan and Low-pressure Blower.

**B** Constant Flow  
**G** Equipment

## Conveyor-Belt System To Be 7 Miles Long

A 7-mile-long conveyor-belt system is being built by the Goodyear Tire & Rubber Co., Akron, Ohio. It will haul raw materials for building the \$58,000,000 Bull Shoals Dam on the White River in Marion and Baxter counties, Ark., 100 miles north of Little Rock. The system will be geared to move 525 feet a minute in order to deliver 650 tons of aggregate per hour for the Flippin Material Co.

Twenty-one belt flights of 30-inch-wide belt will be used to complete this cross-country transport system. It is estimated that the belts will haul a grand total of 4,000,000 tons of crushed stone and sand to the dam site. Each flight will be powered by a 100-hp motor.

At Bull Shoals the quarry is 7 miles from the dam site—requiring 14 miles of belting. Blasted rock will be loaded by 3½-yard shovels and hauled in 12-yard Euclids to the primary crusher. There the crushed stone will be loaded

on the belt for an overland ride to the dam site for final reduction and classification.

The conveyor system will be erected on wooden bents, using native timber, which will vary in height above the ground from 4 to 20 feet. Two valleys will be spanned by means of 80-foot-long suspension bridges. The belt run will require 9,000 steel troughing idlers and 3,600 return rolls. Pneumatic cushioning idlers will be used at the 16 transfer points where the material will be dumped from one belt to another. The entire belt will weigh approximately 360 tons. The series of main-haul belts will utilize 250,000 pounds of cotton fabric and 470,000 pounds of compounded rubber.

### Paver for Curb-and-Gutter

A catalog on the Speedmaster curb-and-gutter paving machine can be obtained from the Dotmar Industries, Inc., 503 Hanselman Bldg., Kalamazoo, Mich. The Speedmaster is designed to pave 5

linear feet of curb-and-gutter every 60 seconds. The catalog features a description of the various shapes of cross sections which can be paved with this machine. These include highway dividing curbs, highway concrete gutters, roll-over or lip curb-and-gutter, etc.

There are several photographs of the

machine in use, and several others showing its component parts. There is also a complete list of specifications for the Model S-24 and the Model S-30 pavers.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 68.

## Lift 88% easier WITH SIMPLEX SCREW JACKS

GET FASTER, SAFER JACKING  
ON ALL CONSTRUCTION JOBS



**CAP**  
is non-slip;  
corrugated  
for safety.

**SINGLE  
BALL**  
floats cap  
9 degrees;  
gives 88%  
easier lifting.

**FLARED  
BASE**  
of tough,  
malleable iron  
for extra  
stability.

**PEEPHOLE**  
eliminates  
measuring.

Put Simplex Screw Jacks on your heavy-duty construction jacking jobs—see how you save in time and effort. These Screw Jacks employ a single chrome-moly ball, nested under the drop forged steel cap, that actually reduces friction 88%! The single ball won't flatten; cap can't slip...even under heaviest loads.

A flared base of tough, malleable iron gives extra stability and protection. The peephole in the base guards against over extension of the screw; insures safety. Colors indicate jack capacities; make selection easy on the job.

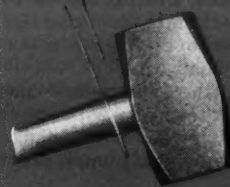
Available in 21 models with 4-Way Head—capacities from 10 to 24 tons. Also available in 10 models with Ratchet Type Head for close quarter operation—capacities 20 or 24 tons.

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**Jacks**

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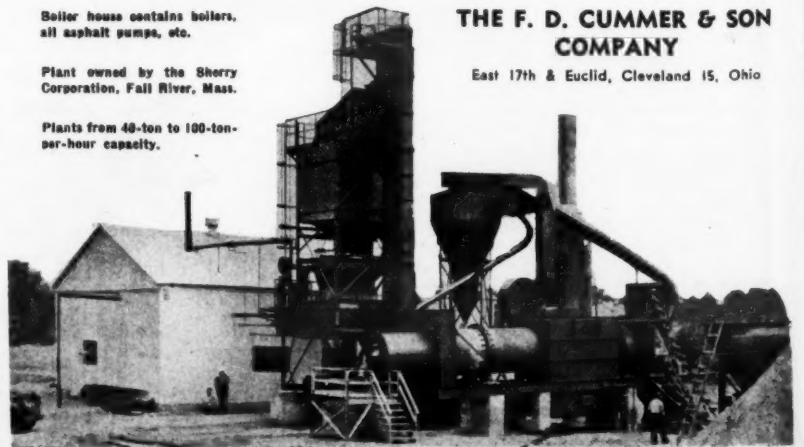
Boiler house contains boilers, all asphalt pumps, etc.

Plant owned by the Sherry Corporation, Fall River, Mass.

Plants from 40-ton to 100-ton-per-hour capacity.

**THE F. D. CUMMER & SON  
COMPANY**

East 17th & Euclid, Cleveland 15, Ohio



# Soil-Cement Paving Job Uses Native Soil

Over 5 Miles Laid at Cost of \$1.40 Per Square Yard in Place; Wearing Surface of Sand and Asphalt

SOIL-CEMENT pavements were recently laid on the streets of Rocky Mount, N. C. This city contracted for the construction of 86,000 square yards of soil-cement streets covering a total of 5.8 miles. It was found that the native soil was well adapted to this type of construction, and City Engineer Frank H. Cothran reported that very little soil had to be removed or brought in for the entire project. Total cost of the paving in place was reported to be \$1.40 per square yard.

The field laboratory control was carried out by Froehling & Robertson of Richmond, Va. The Soils Engineer assigned to the job was R. C. Copper. The work was contracted by the Exum-Cline Co. of Rocky Mount, and D. W. Winkelman Co., Southern Pines, N. C., subcontracted the soil-cement portion.

## Design

The design selected by City Engineer Cothran required the use of a 1½-inch sand-asphalt type of wearing surface. A concrete curb-and-gutter was used to reinforce the base at the edge where it was recognized to be the weakest. On those sections in which no curb-and-gutter was used, the base was built 21 feet wide and was topped with a 20-foot width of surface course.

## Construction

The first step in the base construction called for scarifying the existing subgrade to a depth of 6 inches. When it had been pulverized to a smooth, even consistency, the contractor added cement with a belt-type spreader. The mixture produced was required to contain 10 per cent cement. The specifications required that the soil pulverizing should continue until 80 per cent of the soil passed a No. 4 sieve, based on dry weights and excluding gravel or stone. They also required that the cement should not be applied if the moisture content of the soil exceeded 2 per cent of the optimum required for maximum compaction as determined by the Proctor test. This meant the addition of 42 pounds of cement per square yard.

The cement and the soil were blended by Seaman Pulvi-Mixers. The mixers carried a spray bar for adding moisture to the mix. The exact amount of water required was applied directly in front of the pulverizing blades. It varied according to the soil at each location. Water was received from tank trucks which followed the mixers. When manipulation was complete, the moisture content of the mix was found to be within 2 per cent of the optimum figure determined by the Proctor test.

The next step was to compact the base. Sheepfoot rollers were used for the initial compaction, followed by graders and rubber-tire rollers. The work was so conducted that the base reached its specified density in 3 hours. When it had acquired sufficient compaction, it was allowed to cure for 7 days, and was kept moist throughout this period. When the curing period ended, the base was covered with a prime coat of cut-back asphalt applied at a rate of 0.2 gallon per square yard.

The base attained an average density of 113 pounds per cubic foot at an average moisture content of 11.6 per cent. Test specimens of the soil-cement base showed an average strength of 692 psi after 30 days; 1,040 psi in 80 days; and 1,411 psi in 130 days.

## Wearing Surface

The City specified a 1½-inch wearing

surface of sand and asphalt. This was laid by a Barber-Greene finisher. The asphalt mix used for the wearing surface conformed to these specifications:

Per Cent by Weight	Passing Screen	Retained on Screen
100	4	10
0-10	4	40
5-55	10	80
25-70	40	200
5-50	80	
2-10	200	

The bitumen in a mix ranged between 7 and 10 per cent. But once the mix was selected, it was not allowed to vary by more than 0.5 per cent. The bituminous material was a medium grade with 85 to 100 penetration, conforming to a grade recognized in the State of North Carolina as AP-3.

## Cedarapids Salesman Dies

Carl Crozer of the sales department of the Iowa Manufacturing Co., Cedar Rapids, Iowa, died recently. He had been with the company for fifteen years. During the war, he served with WPB's Construction Machinery Division.



# Dallett's Contractor Tools

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## MOIL POINTS

## GADS

## DIGGING CHISELS

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Write for Bulletin C-220



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# Firestone OFF-THE-HIGHWAY TIRES

## PREPARING



The houses were formed and poured at a central work yard, then transported to the housing area. Four preparations at the yard included fabricating 4 x 4 x 1/4-inch steel reinforcing mats for each house. The crew shown here carries a wall mat towards a set of house forms.

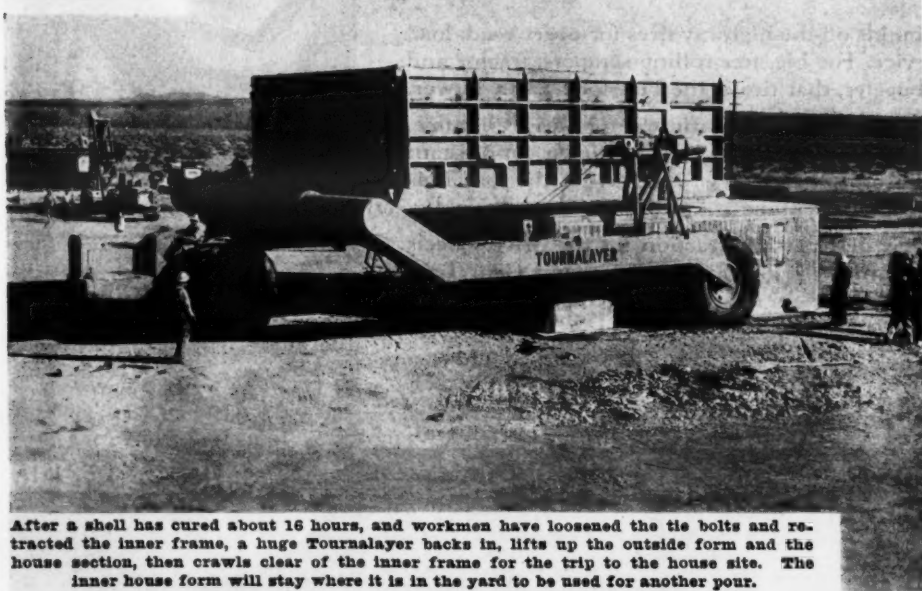


Here the steel mats have been positioned on an inner house form, windows and frames have been dubbed in, and the Tournalayer at left prepares to cover the framework with the outer steel house form.



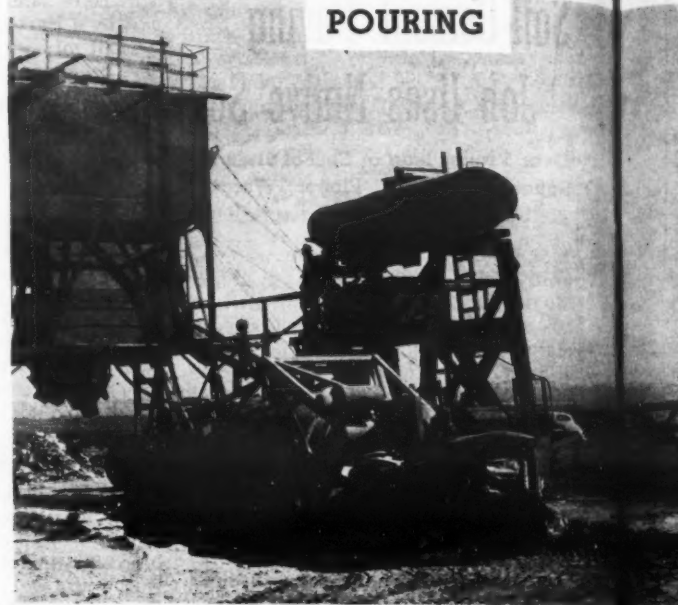
On the roof, meanwhile, a heavier steel mat has been placed, supported on steel-wire chairs 3/4 inch high, and electrical conduits are fitted around it. With forms, steel, and embedded items in place, the pour is the next step.

## PLACING



After a shell has cured about 16 hours, and workmen have loosened the tie bolts and retracted the inner frame, a huge Tournalayer backs in, lifts up the outside form and the house section, then crawls clear of the inner frame for the trip to the house site. The inner house form will stay where it is in the yard to be used for another pour.

## POURING



At a Noble 80-ton batcher set up in the yard, a Tournamixer gets aggregate and cement for the concrete mix. Water is also added there before a Model C Tournapull brings the huge mixer back to the pour site.

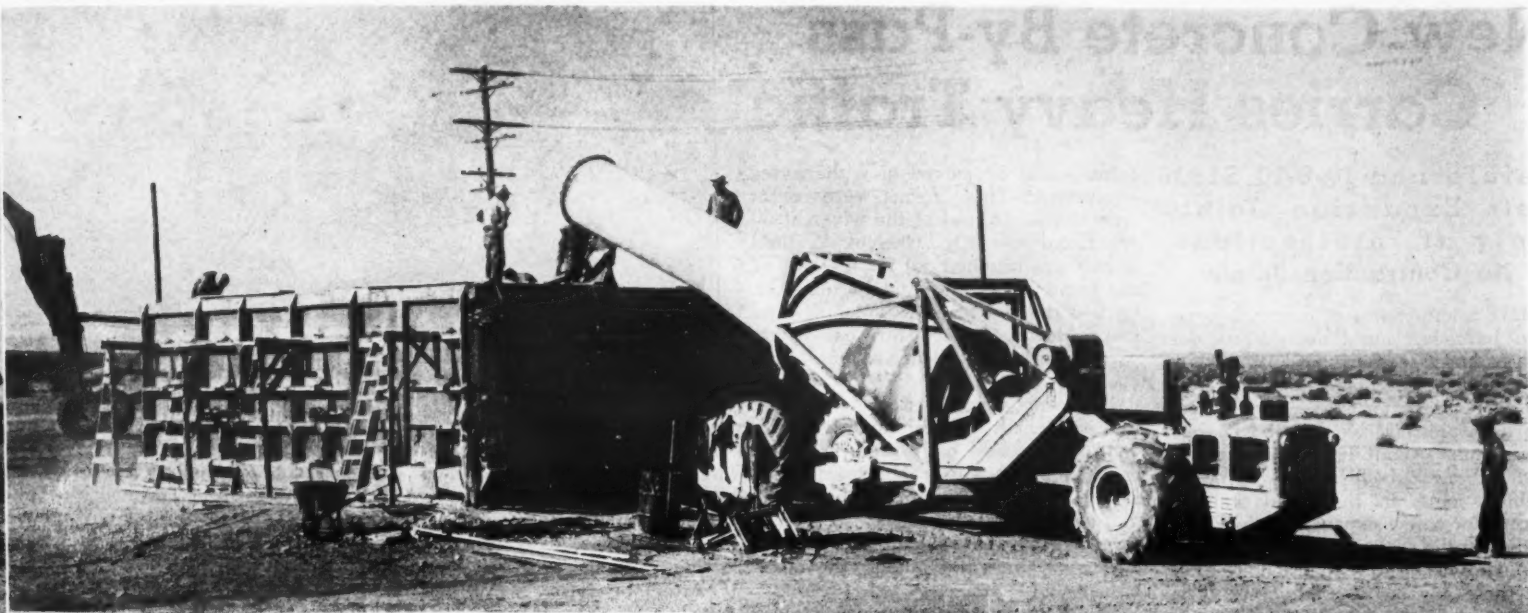
# Concrete Houses By Assembly-

Poured in Sections, Picked  
Totalum

(C. & E. M. Photos)



Near the house site, a Jaeger mixer supplies a cement-sand grout to be used as a leveling course when the Tournalayer sets the house on the foundation. Wheelbarrows haul the grout to the point of use.



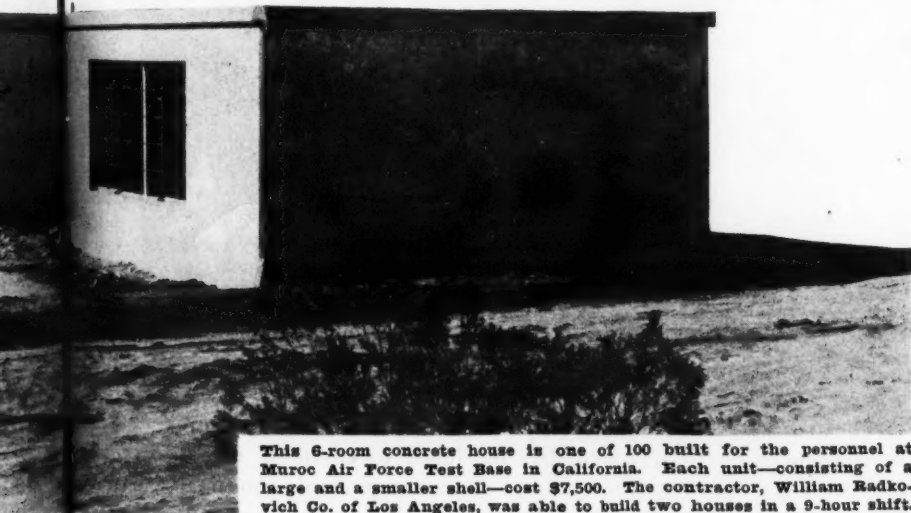
The Tournamixer backs up to a set of forms and feeds a 6.2-cubic-yard load of concrete through its barrel. The 32½ x 24-foot house shells usually took 7 Tournamixer loads; the 18½ x 24-foot shells took 4.

As baffle plates carry the mix up the cannon-like barrel and eject it, men work the concrete into place using a Viber internal vibrator. It took the contractor 1½ hours to pour a 45-cubic-yard shell, and 45 minutes to pour a 25-cubic-yard shell.

# Houses Are Built by-Line Method

is, Picked Up, Then Carried to Site;  
otal Number—100

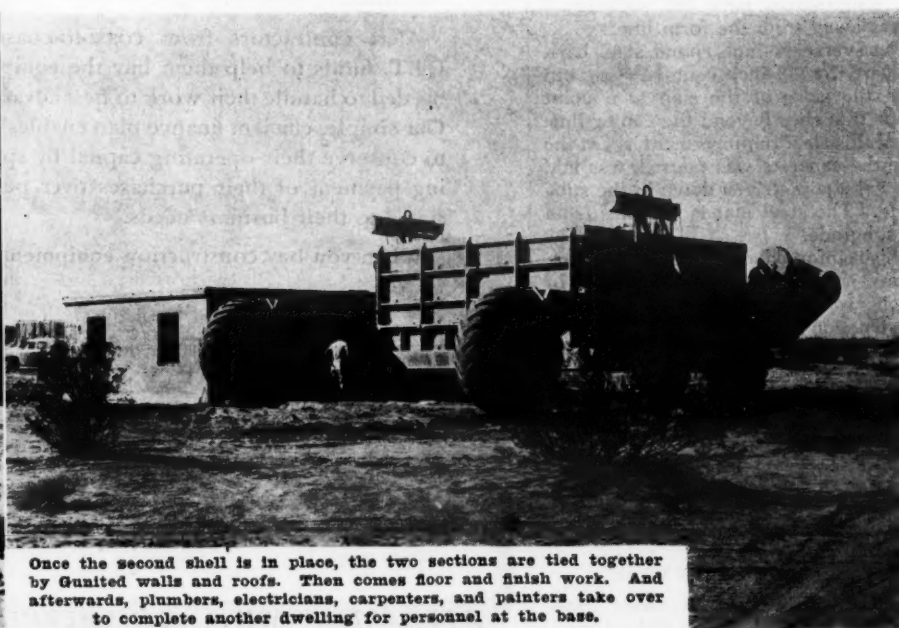
(See article on page 37)



This 6-room concrete house is one of 100 built for the personnel at Muroc Air Force Test Base in California. Each unit—consisting of a large and a smaller shell—cost \$7,500. The contractor, William Radkovich Co. of Los Angeles, was able to build two houses in a 9-hour shift.



As the Tournalayer backs in to the site and suspends the house over the 3-inch concrete foundation slab previously laid, workmen fill a wooden form with the grout. After the house is in place, the Tournalayer will lift the outer form clear and return it to the yard.



Once the second shell is in place, the two sections are tied together by gunited walls and roofs. Then comes floor and finish work. And afterwards, plumbers, electricians, carpenters, and painters take over to complete another dwelling for personnel at the base.

# New Concrete By-Pass Carries Heavy Traffic

**Reinforced 10-9-10 Slab Gets Expansion Joints Only at Intersections; No Contraction Joints**

THE maintenance of concrete-pavement joints has caused many a good design engineer to think hard. The state of Iowa has come up with an answer to the problem, patterned somewhat after the general trend of 1947 in concrete pavements. About 10 miles of an important new cut-off route was paved without joints in the usual manner. Except for a few expansion joints at a bridge on the east end of the job, there are no provisions for expansion. Neither are there any contraction joints. The only joint in the job is a weakened-plane strip down the center line of the pavement.

Booth & Olson, Inc., of Sioux City pushed this new 10-mile by-pass link around the south edge of Marshalltown, Iowa, for the Iowa State Highway Commission. Its \$471,421.83 contract included preparation of roadbed and paving the new two-lane highway with portland-cement concrete. Started August 5, 1947, the paving was completed by October 15.

The new 10-mile by-pass, one of the most important highways Iowa has ever built from the standpoint of traffic-congestion relief, is located on U. S. 30. This is a heavily traveled transcontinental artery. The main source of congestion across Iowa is the Denver-Chicago heavy truck traffic. Before this new cut-off was built, these great trucks had to pass through the city of Marshalltown where they caused serious congestion and traffic slowdown.

Booth & Olson's skilled paving crews, under the supervision of paving-wise Superintendent Don Allen, built the new route to standards which Iowa Highway Commission engineers say will serve traffic for a period of 40 years.

## Design of Pavement

Concrete pavement on the new job is 22 feet wide, including a raised curb 3 inches high and about 1 foot wide, which feathers up from the slab along edges which carry water run-off. The pavement is 10 inches thick at both edges, tapering in 3 feet to a 9-inch thickness. A 2-inch crown put in straight will train rain water towards the sides of the slab.

The pavement is reinforced with four continuous 5/8-inch round steel bars. Two of these are along the pavement center line, each a foot away. The other two longitudinal bars are each set 9 inches away from the form line.

Transverse 5/8-inch round steel bars, staggered on 48-inch centers, come out from the sides of the slab to a point about 15 inches beyond the center line. All of this steel reinforcement, set at the time the concrete was poured, was laid on steel chairs driven down in the subgrade. The steel mat is 5 inches from the subgrade.

This reinforced-concrete slab rests on a clay-soil subgrade, the grading of which was finished by Frank Eblen Construction Co. of Atlantic, Iowa, earlier in the year. Because of a wet year for grading, the top surface was subject to some inaccuracy, generally within a limit of about 2 inches. Any larger irregularities were removed ahead of the paver by an International TD-18 tractor and a Bucyrus-Erie S-90 scraper, which cut off the high places and filled in the low ones.

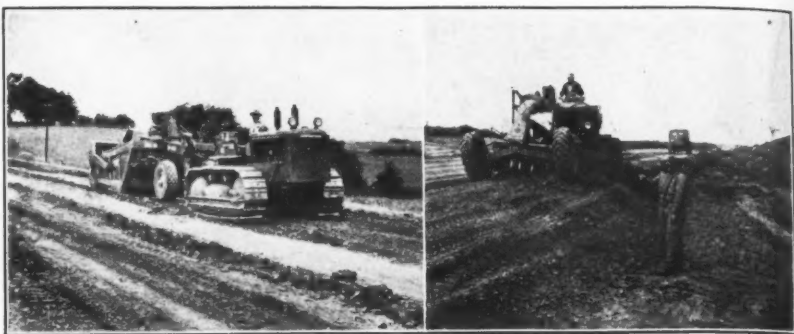
## Preliminary Grade Work

Don Allen brought in about 3,000 linear road-feet of 9-inch Heltzel steel

forms when he moved in with paving equipment. These forms were set at least 800 feet ahead of the paver at all times, and generally 1,000 feet. A slight trench was roughed out for the base of the forms by a Cleveland Formgrader. Part of the 8-man crew which set and staked forms dressed this excavation with shovels just ahead of the setting operation.

The forms were lined up to a string line stretched between survey hubs. Whole stretches of form were also checked by eye after being set. The 8-man crew took care of setting, aligning, and staking the forms. A Jaeger form tamper was used to push dirt securely around and under the form bases.

The grade was bladed down as close



C. & E. M. Photos

An International TD-18 tractor with a Bucyrus-Erie S-90 scraper (left) puts in an initial rough grade on the Marshalltown by-pass, ahead of Booth & Olson's paving crew. The Allis-Chalmers AD motor grader shown at right is blading excess rough-grade dirt to form a temporary shoulder.

as possible just ahead of the form crew by a Caterpillar No. 212 motor grader. A new Allis-Chalmers Model AD machine alternated between the fine-grading and the rough-grading work ahead, doing a big share of the grade work.

After the forms were set, the first machine of a long line-up, a Buckeye

RB Power Finegrader, moved up to take out the last remaining dirt between the forms. This machine dumped the excavated dirt off beyond the sides of the forms, and left the clay subgrade about 1/8 inch high to allow for compaction later on. The Buckeye Fine-

(Continued on next page)

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grader pulled itself along by means of cables fastened to the forms well out in front.

The subgrade was then rolled smooth and dense by an International wheel tractor, with the rear wheels ballasted with concrete. The passage of batch trucks in to the paver also consolidated the ground.

#### Batch-Plant Set-Up

The job batch plant was set up in Marshalltown on the main line of the Minneapolis & St. Louis Railroad. With this arrangement batch trucks had a 3-mile dead haul, with 8 miles to the west end and 4 miles to the east end of the job.

Coarse aggregate for the concrete was shipped by railroad from Cedar Rapids, and sand was trucked in locally. On peak days 800 tons of rock aggregate and 650 tons of sand were handled to the Johnson 50-cubic-yard batch plant, set up along the railroad tracks.

Sand and the one size of aggregate were stockpiled from trucks and railroad cars within reach of a Koehring 604 crane, swinging a 2-yard clamshell from a 55-foot boom. The Johnson bin was separated by a bulkhead into two compartments, to take sand and rock. These bins were charged by the clamshell.

Marquette portland cement in bulk was shipped in from the plant at La Salle, Ill. It arrived at the job in hopper-bottom railroad cars. A receiving hopper, worm-gear feed, and an elevator hoisted it up to a 375-barrel Johnson cement bin, where it was weighed for the dry batch.

Each 34-cubic-foot batch was weighed out according to the following dry weights:

Rock aggregate	2,270 lbs.
Sand	1,830 lbs.
Cement	758 lbs.

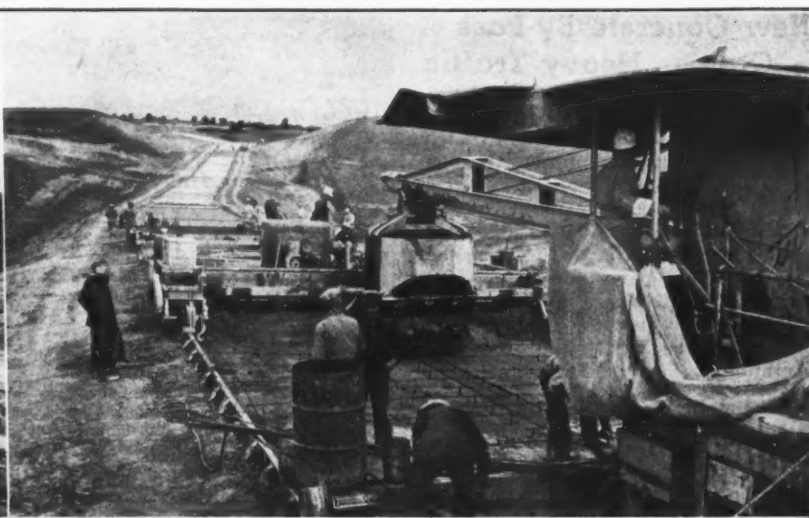
Batch trucks were rented on a batch-mile basis, and as many as 25 machines were used on the long hauls. These trucks backed in to the sand and rock bins to pick up the mineral ingredient, then drove through under the cement plant to pick up the binder. A man stationed at the cement plant covered the loads for the trip out to the job.

#### Paving

Batch trucks loaded with the dry material for the concrete mix arrived on the job at high speed. Gaps in the forms at 500-foot intervals, made by leaving out two form sections, permitted the batch trucks to turn around and back in to the skip of a Koehring 34-E Twinbatch paver. The big Koehring paver rolled out the batches like clockwork, mixing each for a total of 60 seconds. Mixing water came from the Marshalltown city supply, and was hauled out to the job by three trucks with 1,000-gallon tanks. Only 150 feet of 2½-inch rubber hose was necessary to transfer a steady supply of mixing water to the big paver. The trucks were not towed along by the paver. They stayed ahead far enough to keep

the slack out of the hose, under their own power.

Batches were dropped on the grade  
(Continued on next page)



While Foreman Gust Pest looks on, a Buckeye Finegrader (left) planes excess dirt off the subgrade of Iowa's new 10-mile by-pass on U. S. 30. The machine pulled itself along by means of cables fastened to the forms well out in front. At right, in a picture taken from the top of a water-tank truck, we see the Koehring 34-E Twinbatch paver dumping a concrete batch, while finishing equipment brings up the rear.

C. & E. M. Photos

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## New Concrete By-Pass Carries Heavy Traffic

(Continued from preceding page)

usually by placing the center batch first, and following this up with one on each side close to the forms. A steel crew was busy between the paver and the dump point, and all men had to keep alert to stay out of the way of the bucket. The paver operator, who watched out for his ground crew with an eagle eye, cannot be given too much credit for the safety of this particular operation.

### Steel Support Developed

Booth & Olson has developed an interesting scheme for holding the longitudinal steel bars in place next to the forms. This company welded steel arms to the front end of a Jaeger spreader, and put steel rollers on the bottom of these members. As the spreader moves up to distribute the concrete, the wheels travel along at a fixed distance from the subgrade and hold the edges of the steel mat rigidly in place in the center of the slab.

According to a veteran paving inspector on the job, this innovation meant less trouble for him with steel clearance than on any previous job. From the contractor's point of view this little thing meant a saving of labor. Koss Construction Co. of Des Moines, one of the state's biggest contractors, was quick to adopt it. So did the C. H. Atkinson Paving Co. and various others throughout the midwest.

Equipped with this device to keep steel out of the way, the Jaeger spreader distributed the fresh concrete evenly between the forms. The rear end of the spreader was equipped with a Jackson tube vibrator to consolidate the mix.

The paver and spreader averaged 1,500 feet of 22-foot pavement per 12-hour shift. The best day's run, with the job about half-finished, was 1,723 linear feet.

### Finishing Concrete

The initial surface was placed on the slab mechanically by a Jaeger-Lakewood horizontal finisher. With a man at each side to keep surplus material moving ahead, this rig left the surface smooth and reasonably true to grade, with the 2-inch crown formed.

The continuous longitudinal weakened-plane center joint was put in by a Cleft-Plane machine. Rolls of 3-inch material about 1/8 inch thick were used. This was laid down in a slot cut in the pavement by the steel knife on the front of the machine. The machine was not self-powered; the Jaeger-Lakewood finisher reached back on its final pass and towed the rig forward by means of two steel forks, neatly arranged to hook the joint-machine's frame.

The center-joint material was placed about 1/8 inch below the surface of the slab, and the operator of the machine left a wood-troweled finish over the material as he went along. This joint will serve only to induce a crack through the center line of the pavement—not to take care of any expansion or contraction.

The final mechanical finish was put on by a Koehring Longitudinal Finisher, operating well behind the Cleft-Plane machine. It smoothed the concrete to final grade. Any irregularities left behind its big double screeds were smoothed by two long-handled steel floats, operated by finishers. The hand floating was intended to give the concrete surface a denser finish.

Finishers also dressed the edge of the slab along the form lines with steel edging tools. Long-handled wood floats were used occasionally to roughen a surface. The final herringbone finish was put on by two belts, pulled by the same men who operated the long-handled steel floats.



C. & E. M. Photos

Squinting in Iowa's autumn sun, workmen on the Marshalltown by-pass pull form pins (left), using a lever pin puller. At right, workers pour curbs against steel forms, with concrete from a skid-mounted box hauled back and forth from the paver by one good strong Iowa horsepower.

### Curing and Stripping

One of the toughest things which Don Allen faced on the job was a scarcity of labor. This was reflected almost every day in the number of men in the curing and clean-up crews. Many a day a crew of only four men showed up for

work to spread the burlap blankets and Sisalkraft paper curing mats behind the paver. To genial John T. DeJong, Curing Foreman for Booth & Olson, it seemed that his crew members dropped off every time a hard wind came up: just the time he needed them most.

The concrete was usually cured for about 5 hours by covering it with burlap and spraying it with water from a tank truck. This permitted a quick straight-edge check to see if any part of the slab deviated more than 1/8 inch in surface elevation in any 10-foot distance. Major faults were much easier to correct then than later, after the slab had hardened.

After the straight-edge check-up and any corrective measures in the form of grinding, brushing, brooming, or shovel work, the surface of the slab was covered with burlap or paper and left to cure for 3 days. Sections covered by paper were weighted down along the edges by dirt, and the burlap was wet continuously. The paper mats came in rolls 24 feet wide and 60 feet long.

Specifications required steel forms to remain in place at least 12 hours after a pour. Pins were easy to extract from the clay subgrade with a hand lever puller. The forms were pried loose, cleaned by hoes and shovels, loaded to

(Concluded on next page)

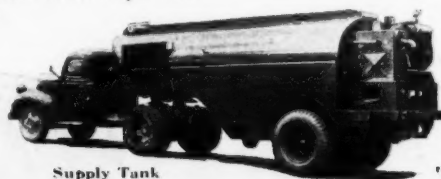
# YOU DON'T HAVE TO BEAT YOUR BRAINS OUT BUILDING OR MAINTAINING ROADS WITH A "SPRAY MASTER"

There's no sense using inefficient, costly to operate equipment when Building or Maintaining Roads, Streets, Highways or Runways when the Littleford "Spray Master" Pressure Distributor does the job without a single hitch. "Spray Master" Distributors are working the country over for Highway Departments and Contractors spraying bituminous materials, with the Full Circulating Vacuum Flow 24 ft. Spray Bar, cutting the cost of every job. The "Spray Master" is the modern gadgetless spraying unit, time tested through rugged use, making better Roads, Highways and Runways for the ever increasing traffic.

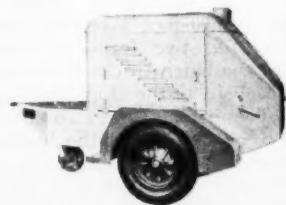
"Spray Master" Pressure Distributors are not just an ordinary spraying unit, but an engineered piece of equipment, designed to give its users efficiency, low cost operation. It stops and starts the spray instantly, circulates by vacuum not pressure, has one valve for operating the spray bar, one Low Pressure Atomizing Burner using low cost fuel. These are only a few of the many advantages of the "Spray Master." For a sturdy unit to build the much needed weather beaten Highways, use a "Spray Master." Write for Bulletin No. 14.



Road Broom



Supply Tank



"Tanker" Steam Heater



## LITTLEFORD

485 E. PEARL ST.,

## LITTLEFORD BROS., Inc.

CINCINNATI 2, OHIO



C. & E. M. Photo  
Pick Mover, left, Assistant District Engineer for the Iowa State Highway Commission, confers with Don Allen, Superintendent for Booth & Olson.

a flat-rack Ford truck, and moved to the head end of the job. Whatever was poured one day was stripped and moved ahead the next.

#### Curb Work

The raised curb on the low side of concrete pavement, designed to carry water to flume turn-out structures, was poured monolithic with the slab. Steel forms in 10-foot sections 3 inches high were clamped to the top rail of the Heltzel forms after all mechanical equipment had passed by. The curb was then made by shoveling fresh concrete in from a small 6-cubic-foot box, mounted on skids. The box was replenished at the paver dump, and hauled back to the point of placing by one good strong Iowa horse.

After the fresh concrete was shoveled in place, the surface of the curb was formed by dressing it with a steel slide or "curb mule" built to fit the finished curb.

#### Personnel

The new Marshalltown cut-off, a Federal-Aid project, was designed and administered under the general supervision of Fred R. White, Chief Engineer of the Iowa State Highway Commission. A. A. Baustian is Construction Engineer, and J. D. Durham was Resident Engineer.

Don Allen, as General Superintendent for Booth & Olson, Inc., directed all actual paving construction in the

field. Clyde L. Burris, Paving Foreman for Allen on many a job, ran the job at the paver and other machines.

Later, when the 9-foot shoulders and final grading was done on the roadside, seeding contractors took over to start a growth of grass and legumes along the right-of-way. This will tie the dirt down in place, and will serve to accentuate the beauty and strength of the new highway.

#### Electric-Motor Line

A line of electric motors ranging in capacities from 1/6 to 5 hp is made by the Leland Electric Co., 1501 Leo St., Dayton 1, Ohio. The Leland line includes several standard types covering a wide range of styles and models to fit the various needs to which motors in this horsepower range can be put. Fan-cooled models are available in explosion-proof or in open styles which are said to be drip-proof. Standard units are made with sleeves or ball bearings, in vertical or horizontal models.

The Type RA motors are described as repulsion-start induction-run, single-phase, dual voltage, and are recommended by Leland for most general purpose applications; they are available from 1/3 to 5 hp. The Type KL is a single-phase, capacitor-start induction-run type with ratings from 1/6 through 3 hp. The general purpose Type PA poly-phase motor is available from 1/6 to 5 hp. In the explosion-proof construction, Type RA, Type PA, and Type DM are available in the above ranges, and carry Underwriters' listing for Class 1, Group D conditions.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 97.

#### Caterpillar Representative

Francis McNamara has been appointed Eastern Division Sales district representative for the Caterpillar Tractor Co., Peoria 8, Ill. He will contact dealers in Massachusetts, Rhode Island, Maine, and the maritime provinces of

Canada and Newfoundland. He succeeds R. S. Cornell, who recently became an Assistant Eastern Division Sales Manager at the main office.

#### Tree-Trimming Equipment

A 24-page catalog on its complete line of products is available from the Bartlett Mfg. Co., 3003 E. Grand Blvd., Detroit 2, Mich. Described in Catalog No. 29 are road signs, safety belts and saddles, tree climbers, saws, and a general line of equipment for tree trimming and pruning.

Each of the items is covered in detail, and the major ones are illustrated. The various features claimed for each item are listed, as are its dimensions and other specifications. Also listed are several textbooks on tree preservation, transplanting, and other subjects of interest to those concerned with the various phases of highway development.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 75.

**Built to match the speed and efficiency of other Euclid earth moving equipment, the Euclid Loader provides fast, mobile loading of large capacity hauling units. It loads practically any material — from loose sand to hard clay and shale — in a short travel distance.**

**The Euclid Loader has set new records for earth moving on many types of jobs. It has cut costs and increased production on such work as dams, levees, airports, highway and railroad construction, industrial plant grading, and overburden removal in strip mining.**

**The wide cutting blade and mold board plow send a steady flow of material to the 54" belt driven by a diesel engine mounted at the rear of the Loader. Maximum cutting depth is 24" — grading cuts can be made up to 9' 6" in width. Three control levers within easy reach of tractor operator start and stop the belt and adjust the cutting edge for angle and depth of cut. Heavy duty design and construction assure long life and big yardages at low cost.**

**Ask your Euclid distributor or representative for information on the complete line of Euclid earth moving equipment.**

**The EUCLID ROAD MACHINERY Co.**  
Cleveland 17, Ohio

**Available on skids, steel wheels or pneumatic tires.**

**A complete line of sizes from 1 1/2" to 10". Also 3" and 4" Diaphragm Pumps. See the nearest CMC Distributor or write for catalog.**

**CONSTRUCTION MACHINERY CO.'S**  
WATERLOO, IOWA

## Joint Group Holds Confab On Roadside Development

A very practical meeting was held recently in Des Moines, Iowa. Fourteen contractors and superintendents met with nine members of the Iowa State Highway Commission's Construction Department to discuss problems connected with roadside development.

It was the unanimous opinion of all who attended the meeting that it was outstanding as far as contractor-engineer relations are concerned. Questions were raised on many problems which had been encountered in the field. The discussions covered all phases of roadside development—design, construction, equipment, inspection, and specifications. Often a question raised by one contractor could be answered by another who had run into a similar problem and licked it.

In commenting upon the meeting, D. B. Chittenden, Landscape Engineer, Iowa State Highway Commission, said, "I believe we accomplished more for

the good of the cause in that one day spent together than could ever be accomplished through field contacts alone. By working with a small specialized group of this kind, it was possible to give greater attention to details directly connected with the work and everyone was afforded an opportunity to enter the discussion—something not possible with a large, diversified group."

As for further meetings, Mr. Chittenden said, "Due to the enthusiastic support and cooperation of all those engaged in roadside improvement work, whether contractor or engineer, we hope to make this an annual affair".

## Guards for Traffic Lines

An information sheet on its flag guards for protecting freshly painted traffic lines has been prepared by the General Road Equipment Co., Hanna Bldg., Cleveland, Ohio. These guards are designed to straddle a 6-inch line. In addition to the standard-size unit, two special staffs are also available. One

is a 42-inch-long staff, and the other is the 42-inch staff equipped with an attachment for flying two danger flags at an angle, in addition to the vertical signal.

The sheet describes the guards and points out their features of construction. Special emphasis is placed on the spring action at the base of the staff. This is designed to hold the flag upright, and at the same time to allow it to be folded down for storing or transporting. Other construction details are also illustrated

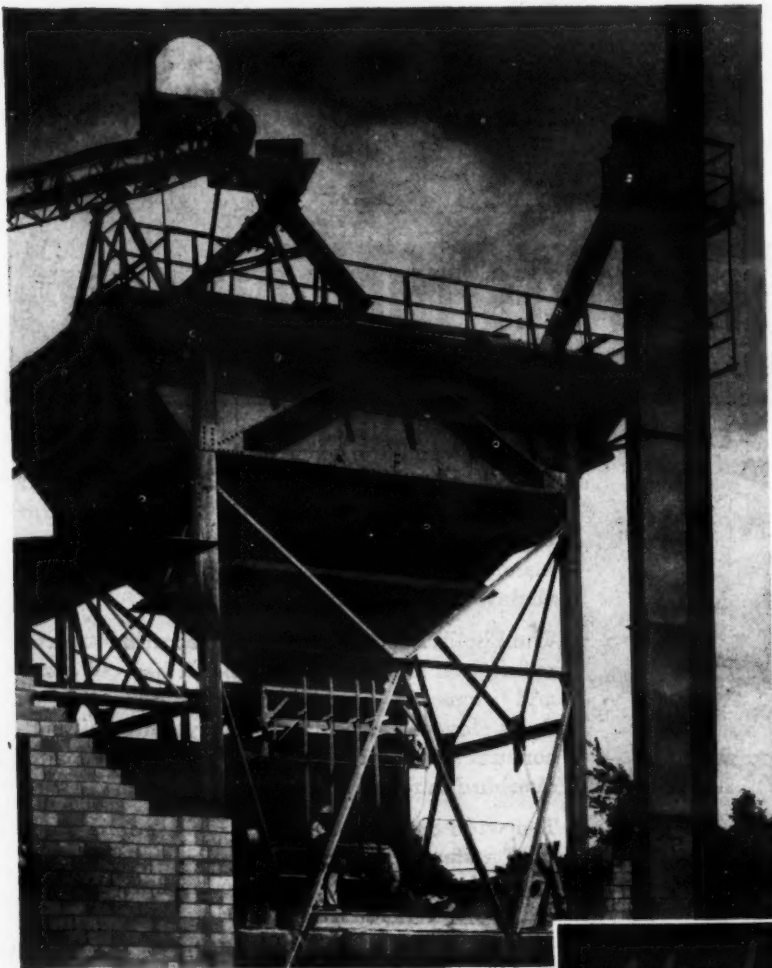
and described.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 76.

## Harry Reade of Airco Dies

Harry W. Reade, Apparatus Sales Manager for the Air Reduction Sales Co., of New York City, died recently the age of 56. At the time of his death Mr. Reade had been with the company for 33 years.

# HELTZEL BINS



When you think of bins you think of Heltzel Bins. That's natural because your experience and the testimony of all bin users have proved that Heltzel's concentrated engineering in concrete equipment has brought about practical developments that pay off in durability, versatility and trouble-free operation. We're proud of the demand for Heltzel bins and batchers and we're sorry we can't ship orders at a normal rate. We're doing the best material supply will permit. We know you want the best and will be patient and make your old equipment do until you can install a Heltzel.

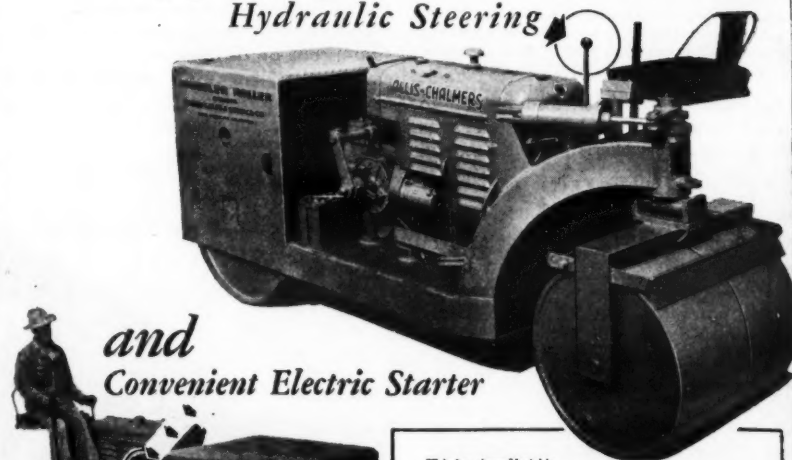
# HELTZEL

STEEL FORM & IRON CO.  
WARREN, OHIO - U. S. A.

BINS, Portable and Stationary  
CEMENT BINS, Portable and Stationary  
CENTRAL MIXING PLANTS  
BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)  
ROAD FORMS (with lip curb and integral curb attachments)  
CURB FORMS  
CURB AND GUTTER FORMS  
SIDEWALK FORMS  
CONCRETE BUCKETS  
TOOL BOXES  
FINISHING TOOLS FOR CONCRETE ROADS

# WHEELER Tandem Rollers

Bring you Single-Lever Hydraulic Steering



This 3 to 4 ton Variable-Weight roller is popular on the job. Its convenient features include the single-lever clutch, the foot operated parking brake and easier maneuverability.

## SPECIFICATIONS

POWER: Allis-Chalmers Industrial Model B.  
24.5 Brake Horsepower @ 1500 RPM.  
27.8 Brake Horsepower @ 1800 RPM.  
Speeds 2 forward and 2 reverse give 1.55 to 4 MPH range in either direction.

DIMENSIONS: Wheel Base 7' 10"; length overall 10' 7"; width overall 3' 6". Tank height 4' 10". Ground clearance 10" Left side clearance 1 1/2".

WEIGHTS: Shipping weight (approximately) 5500 lbs. Maximum weight (with ballast) 8000 lbs. Extra metal weight 400 lbs.

COMPRESSION Per Lineal Inch: Compression roller, 150 lbs. with ballast. Steering roller 70 lbs. with ballast.

TIMKEN BEARING EQUIPPED THROUGHOUT  
Write for new 6-page folder.

Wheeler Tandem Roller's single lever, hydraulic steering and electric starter can improve your on the job efficiency. The Hydraulic steering is engine powered. Operating by finger tip control, the steering knob moves to right or left, leaving the operator free to devote full attention to the rolling job at hand. Turning and maneuvering is greatly simplified; the square footage rolled per day can be increased. This single steering knob is the only control needed to slowly or quickly turn a Wheeler Roller in any direction. Convenience means faster operation.

## ELECTRIC STARTER AIDS OPERATION

The electric starter, now offered with the Wheeler Roller, simplifies starting and stopping. Idle running time is reduced and waste of fuel is minimized. Well within the operator's reach, the starter reduces the operator's labor and operating time.

NEW DEALERS are being added—Chalmers territories are still available

## WHEELER ROLLER

Division SHAW SALES & SERVICE CO.  
5100 Anaheim-Telegraph Road, Los Angeles 22, California

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# To Save You Money

## Mall HI-KIK Concrete VIBRATOR



With wheelbarrow or round base mounting.

★ Does Vibrating • Wet Wall Rubbing • Form Sanding • Sawing • Pumping • Grinding • Wire Brushing • Drilling • Sharpening tools and bits right on the job.

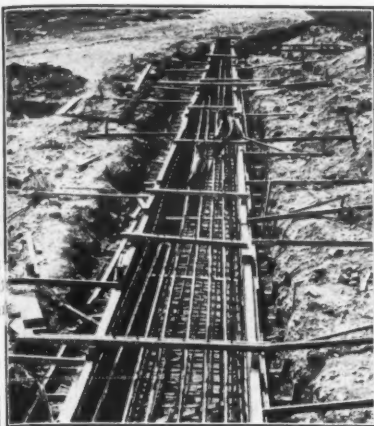
Here's the 3 H.P. Gasoline Engine all-purpose concrete vibrator you have been waiting for. It cuts time, labor and material costs on every job. Has long-reaching flexible shaft that goes everywhere. It is easy to keep power unit busy by simply interchanging attachments for different jobs. It is easily wheeled anywhere and operates all day on 1 1/2 gallons of gasoline.

Ruggedly constructed of finest quality materials, 2-cycle design engine has automatic clutch and variable speed control to 7000 frequencies. Vibrator head is equipped with roller bearings for high radial loads to assure long life, heavily armored tip to resist abrasion and patented revolving off-center, lead cast weights for high kick.

A must for jobs that pay a profit—see it at your Mall Equipment Dealer TODAY. Write for FREE Booklet Mall Concrete Vibrators.

Contractors' Equipment Division

MALL TOOL COMPANY, 7743 South Chicago Ave., Chicago 19, Ill.



These wrought-iron pipes will carry hot water and anti-freeze under the entryway of a new hangar at the Chicago Municipal Airport, to keep the pavement clear of snow and ice for a strip 7 feet wide and 514 feet long.

### Snow-Melting System Installed at Airport

An embedded snow-melting system has been installed at the entryway of a new hangar at the Chicago Municipal Airport. It has been built for the American Airlines. The wrought-iron pipe used was furnished by the A. M. Byers Co. of Pittsburgh. The strip in front of the hangar door is 7 feet wide and 514 feet long. The system is embedded in the concrete and is designed to prevent the hangar doors from freezing shut during icy or snowy weather.

The snow-melting system consists of nearly two miles of 2 and 2½-inch pipe which will carry a mixture of hot water and anti-freeze. The water will be heated by a boiler located in the hangar. It will flow through the pipes, be returned to the boiler, reheated and recirculated through the system. In warm weather, the water may be drained out and then be replaced for the winter months.

### Light-Duty Tractor

Production of its 1948 Model IB wheel tractor has been started by the Willis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis. It is rated at 33 hp, and is recommended by the company for general utility work. Weight of the unit is slightly over one ton. It has a wheelbase of 57 7/16 inches, a length of 97½ inches, and a ground clearance under the front axle

of 8¾ inches.

Among the features claimed for the unit are its convenient location of controls, a quick-hitch coupler, variable tread widths, and a frame for mounting equipment. Among the operational features listed are flexibility and convenience of use, and economy of operation and performance.

Power is provided by a 4-cylinder gasoline engine. According to the manufacturer, the IB develops 16.3 belt hp at 1,400 rpm, and 13.5 hp at the drawbar. It has three forward speeds and one reverse speed. At 1,850 rpm, the top forward speed is 10.0 mph. Standard equipment includes an electric starter, lights, foot brakes, foot and hand throttle, muffler, adjustable radiator shutter, air cleaner, and other regular

equipment.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 43.

### Form-Coating Plastic

A plastic coating said to be impervious to water, salt air, and mild acid solutions is made by the Calresin Corp., Culver City, Calif. Known as Plastiglaze, it can be used in the construction industry to coat plywood forms, to coat under-water piling, etc. The company says that when Plastiglaze dries, it leaves a luster on the coated material, and that it won't wear off, peel, or chip.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 16.

### Paint for Concrete

A new paint for protecting concrete surfaces has been introduced by Lowebece, Inc., 1525 E. 53rd St., Chicago 15, Ill. Marketed under the trade name of Oncrete for Concrete, it is a synthetic paint designed to provide an abrasion-resistant coating that does not check, crack, or "dust".

According to the manufacturer, this new paint contains almost no drying oils; dries by evaporation, rather than by oxidation; it resists heats of up to 500 degrees F; it resists abrasion and wear and tear under heavy use; it resists the effects of acid and alkali.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 26.

*All over the country...on all kinds of jobs...the trend is to...*

## LA PLANT-CHOATE MOTOR SCRAPERS!



Highway Relocation work in California



Road Building in Idaho



Loading sand in Michigan



Stripping in Pennsylvania

Formally introduced to the trade a few months ago, these high-speed earthmovers have already established a reputation for making more money...for easy operation and most important—for staying on the job with a minimum of down time.

From coast-to-coast...in Great Britain...Sweden...South Africa—LaPlant-Choate Motor Scrapers are at work on an ever-increasing variety of jobs!

Sixteen horsepower per struck yard of capacity provides more power for loading...for hauling...for ejecting...any material under any operating condition. Safe, positive, hydraulic steering thru double-acting jacks. 60° turns each way.

For complete details and operating data, see your nearest LPC distributor.

LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Avenue, Oakland, California.

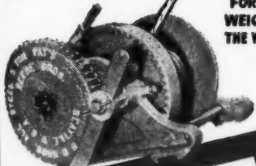


ALL STEEL HAND HOIST  
SEATTLE, U.S.A. TRADE MARK REGISTERED

### HOISTS

Write, wire or phone for complete information on models, prices and optional equipment.

THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD



BEEBE HOISTS ARE MORE THAN STRONG ENOUGH TO DO THE JOB!  
PROVEN WORK POWER! For 24 years, Beebe Hoists have been the most dependable and efficient hand hoists manufactured! Silent, compact, powerful hoists of high grade electric steel, serve faithfully every day through the years.  
"IN THIS RUGGED STRENGTH LIES SAFETY"

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Dealers in all World trade centers  
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# LAPLANT CHOATE

HIGH SPEED EARTHMOVING EQUIPMENT

FOR LOWEST POSSIBLE COST PER YARD...PER JOB...PER YEAR

## Contractor Hurries Irrigation Project

Concrete and Earth Work Is Pushed Rapidly as All-American Project Approaches Completion

THE Coachella Branch of the All-American Canal in southern California is being pushed another 7.8 miles for the Boulder City Office of the U. S. Bureau of Reclamation. Otto Ashbach & Sons, contractor from Saint Paul, Minn., has the \$700,000 contract which includes earth work, concrete lining, and structures.

Completion of the Ashbach contract in May, 1948, will finish the famous All-American Canal proper. In the past decade, since the project was initiated, various contractors have pushed through man-built canals to carry the life-giving waters of the mighty Colorado River more than 100 miles into the fertile Imperial and Coachella Valleys. The Ashbach job will extend the canal beyond U. S. 70 and 99 just south of Indio, Calif.

The canal is now so nearly finished that its bottom width is only 8 feet, with  $1\frac{1}{2}$  to 1 side slopes. Its sides are being lined with a  $3\frac{1}{2}$ -inch reinforced slab of portland-cement concrete. Some of the original Coachella Canal machines, manufactured by Clyde Wood of North Hollywood, Calif., are rented from the Bureau of Reclamation by Ashbach. They were cut down to the reduced size in Wood's shops, and are being used to trim and line the new canal section.

### Excavation Work

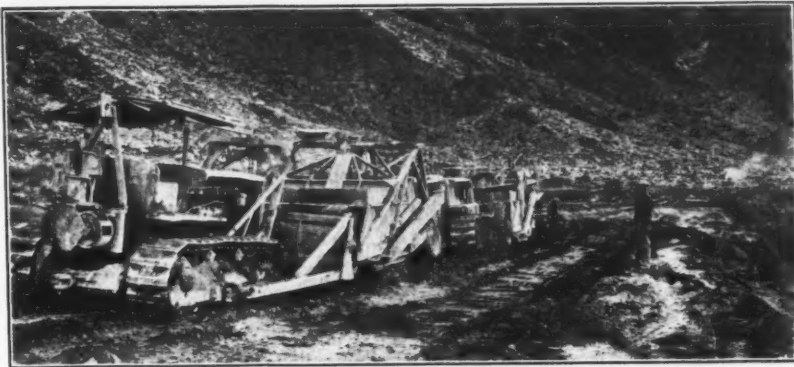
All canal excavation work, aside from trimming, is being done under a sub-contract by the A-1 Construction Co., of Indio, Calif. Now that the Coachella Canal has progressed past the Chocolate Mountain Range, excavation is easier. Sand and sandy silt make up the bulk of earth work.

Four Caterpillar D8 diesel tractors, towing an 18-cubic-yard Wooldridge Terra-Clipper, with an Allis-Chalmers HD-14 and the same type of scraper, make up the heavy-duty digging fleet. Four LeTourneau Super C Tournapulls are used on hauls beyond 1,500 feet. Two Caterpillar D8's with pusher blocks welded in the center of their bulldozer blades are being used for double duty; partly to assist in loading the other units, partly to dress the banks of the canal.

Sections to be excavated are divided on the balance points with as little over-haul as possible, leaving a plug in the canal about every 700 feet so the machines may ramp up to the original ground surface. Each of these plugs is then removed by hauling the material up over the next one. The canal banks, about 14 feet wide and 9 feet deep, are dressed by one of the D8-mounted bulldozers, which travels along horizontally with the bank.

In some sections, where the canal must be built up above the normal ground surface to meet the proper gradient, extensive soil compaction is necessary. Three 3,600-gallon spray trailers behind White trucks haul the water from a Le Roi-driven CMC pump at a deep well near by. Two LaPlant-Choate double-drum sheeps-foot rollers compact the soil after the 6-inch lifts are wet down, and A-1 Construction Co. is using an Adams Model 511 motor grader to dress the tops of levees and maintain haul roads for the Tournapulls.

As the excavation equipment and operators move to new "stands", a skid-mounted mobile service unit goes along. It consists of lubrication, fuel, and weld-



C. & E. M. Photo  
During excavation on the Coachella Branch of the All-American Canal, two Caterpillar-drawn Wooldridge Terra-Clipper scrapers pick up loads from a borrow pit, helped by a Caterpillar D8 pusher.

ing service. And with the equipment being used one 10-hour shift daily, mechanics have enough time to keep it in excellent shape. Factory parts and Texaco lubricants are being used throughout for this service. Texaco's Aleph engine oil, Marfak No. 1 grease,

and drums of Texaco heavy track-roll lubricant are in constant evidence.

In ten hours' work, the excavation equipment was operating—when the job was visited—at a scheduled rate of production of 500 feet of canal per day, or about 3,640 cubic yards.

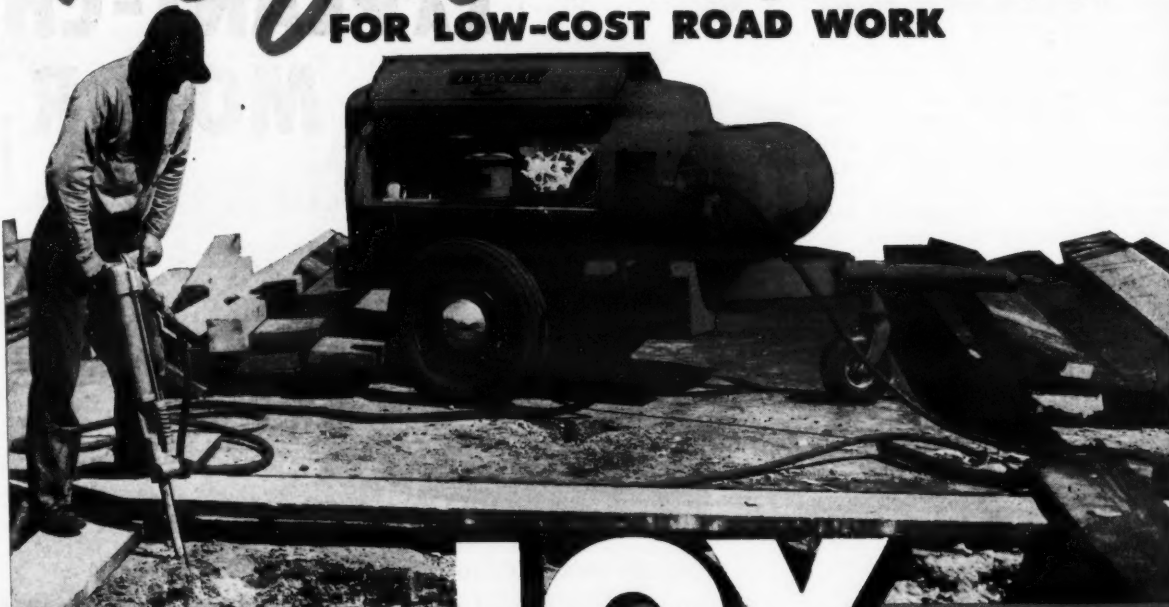
### Canal Trimming

A special trimming machine, built originally by Clyde Wood for a contract lower down on the canal (see C. & E. M., July, 1946, pg. 2), is used to trim excess earth from the bottom and side slopes of the roughed canal. The wheelbase of the machine has now been reduced to 37 feet, to allow it to travel along on rails at the top of the canal sides.

Main power for this rig comes from a Murphy diesel engine, with an Electric Machinery Mfg. Co. 50-kw generator. All functions of this trimmer are actuated by electrical energy from the generator. The two endless bucket lines which scoop the earth and carry it beyond the canal limits are driven by 20-hp Fairbanks-Morse induction motors, through Falk reduction gears. A 5-hp Electric Machinery Mfg. Co. motor on each side drives the wheels through travel gears. The 24-inch cross conveyors which feed earth to the main discharge conveyor are also driven by 5-hp motors.

(Continued on next page)

## Perfect Partners FOR LOW-COST ROAD WORK



# JOY



### SERIES 80 AIR COMPRESSORS from 68 to 630 c.f.m.

Two stage, air cooled compressed air plants—gasoline or diesel driven—with size and weight kept to a minimum to make them really portable, yet delivering air more efficiently than ever before.

Econo-Miser Load Control  
regulates air supply to meet  
the demand of the job.



### JOY SILVER STREAK Cadmium Plated Rock Drills.

Cadmium plating not only protects your Sullivan drills from rusting, but, the lubricating properties of cadmium prevents scoring should lubrication temporarily fail.

Consult a  
Joy Engineer  
or write for  
bulletins



# JOY MANUFACTURING CO.

SULLIVAN DIVISION

GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.



C. &amp; E. M. Photos

Four Rodgers hydraulic jacks, one on each corner, are used to keep the machine level and in the right plane with the canal lining. Dry sand in the locality is so unstable when freshly dug that a special sprinkler bar has been installed on the trimmer machine. This sprinkler bar, a 1½-inch perforated pipe, receives water from two 1,200-gallon water-tank trucks. They deliver water under pump pressure through a hose to this bar.

Some of the curves in the upper Coachella Canal are sharp, but when the project was visited the machine was able to trim about 70 feet per hour without difficulty. As a matter of fact, the labor crew which set the rails around the curves ahead of the machine was having the most difficulty, especially when the rails had to be heated and bent.

Excess dirt, dumped at the top levee of the canal, was usually smoothed down to form a berm.

#### Batch-Plant Set-Up

Batching and hauling concrete is done under another subcontract by Triangle Concrete Co. of San Bernardino, Calif. This subcontract includes the processing cycle from raw materials to mixed concrete.

The batch-plant set-up includes four open storage piles for sand and three sizes of rock; a 100-ton Kenweld batching bin with Hardy beam scales; and a Bucyrus-Erie 22-B crane with a ¾-cubic-yard McCaffrey clamshell bucket. An Allis-Chalmers HD-7 tractor is used to keep the stockpiles shaped and separated, and four truck-mixers haul the batches. Three of the latter are Jaeger low-dumps, and the other is a Rex high-dump.

J. E. Roberts of San Bernardino is hauling sand and three sizes of rock aggregate about 43 miles one way from the old Bureau of Reclamation materials stockpile near Frink, Calif. Colton portland cement is shipped by railroad in bags, and transferred from the Indio siding to the job by trucks owned by Thomas Avery of Coachella.

The raw ingredients are mixed at the batch plant according to the following dry formula for a 4.09-cubic-yard batch:

Material	Dry Weight
Sand	5,350 lbs.
No. 4 rock, ¾ to 1½-inch	2,440 lbs.
¾ to 1-inch rock	3,370 lbs.
1 to 1½-inch rock	2,090 lbs.
Cement	2,068 lbs.

Mixing water for the batches is pumped from a deep irrigation well near by, and stored in a 12,000-gallon elevated water tank. The water then flows by gravity to the truck-mixers, after they have received the dry batch.

#### Concrete Lining in Canal

After a 10-minute trip to the job, the truck-mixers discharge their loads to a receiving hopper alongside the slip-form canal-lining machine. The concrete then travels to the top hopper on the slip form by means of a 30-inch elevating conveyor belt, where the mix is ready to be placed.

The slip form, also made by Clyde Wood, depends on an International UD-18 industrial diesel engine and a 440- (Continued on next page)

A Caterpillar D8-mounted bulldozer (at left) dresses 1½ to 1 slopes along the Coachella Canal, to finish the excavation subcontract held by the A-1 Construction Co. of Indio, Calif. Then a special trimming machine (at right) takes over for Otto Ashbach & Sons to trim excess earth from the bottom and side slopes of the roughed canal. The machine was built originally by Clyde Wood of North Hollywood, Calif.

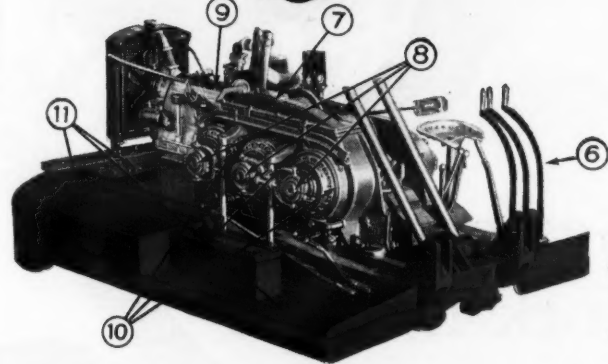
# Look into UNIT!

## FULL VISION CAB



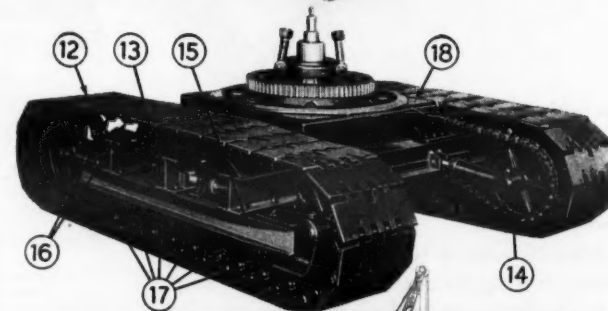
1. Streamlined to the minute in design . . . operator can see in ALL directions . . . clear visibility around a complete 360° circle, without sacrificing weight, capacity, or headroom.
2. Sliding side panels provide accessibility to motor and clutches.
3. Easily lifted top hood covers . . . locked from within the cab.
4. Shatter-proof Safety Glass used throughout the entire cab.
5. A Frame front legs and end connections are one-piece drop forgings.

## MAIN MACHINERY



6. Curved operating levers . . . for easy operation and control.
7. One-piece cast gear case completely encloses all gears and shafts in a constant flow of oil . . . Positive protection for all moving parts. Bored for perfect alignment by machine designed specifically for this accurate operation . . . misalignment is impossible.
8. Heat-treated alloy steel gears and shafts are involute splined. No keys to replace . . . no worn-out keyways. Large diameter shafts with short spans between bearings . . . minimizes deflection and bending . . . reduces bearing replacement.
9. Gas or Diesel engines are mounted in straight line with main machinery. Worm driven power take-off . . . silent, efficient, and compact.
10. All operating clutches are disc type . . . interchangeable . . . simple adjustment . . . mounted on high-speed countershafts instead of directly to drum shafts . . . smoother operation and longer life.
11. Turntable, Platforms, and Counterweight . . . These three important members are perfectly aligned, forming a single rigid unit that provides extra resistance to shocks and strains.

## LOWER STRUCTURE

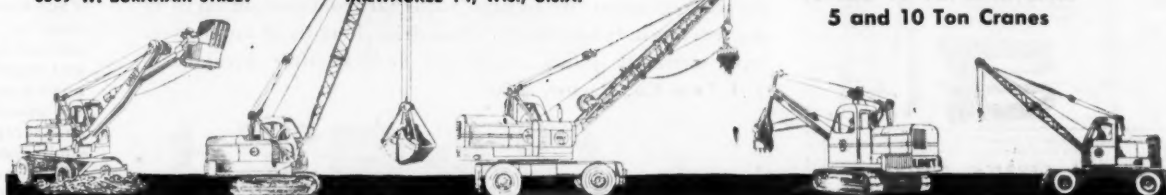


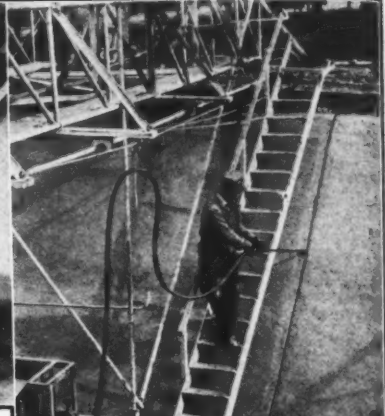
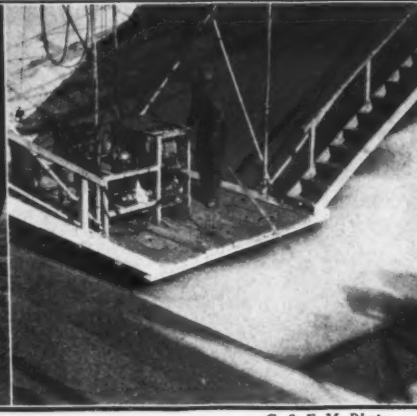
12. Multiple hinged shoes maintain alignment . . . minimize wear of shoes and tumbler.
13. Single adjusting screw for adjusting tread belt and drive chain enclosed in grease, free from dirt, rust, or outside damage.
14. One-piece end bearings with added outboard bearings maintain perfect and permanent alignment of drive shaft and end roller shaft.
15. Husky trussed frame . . . reinforced by one-piece end castings.
16. Drive Sprocket guides . . . prevent treads from jumping off if operating too loose.
17. Idler rollers are drop forged alloy steel . . . manganese bronze bushed . . . Alemite lubrication.
18. Heavily ribbed and flanged lower frame (carbody) of annealed alloy steel . . . roller track cast integral with body.

Automatic Traction Brakes are another exclusive UNIT feature! A friction type locking device for both crawlers . . . self-engaged by spring action . . . automatically released when power is applied.

½ and ¾ Yd. Excavators  
5 and 10 Ton Cranes

CONTACT FACTORY DIRECT FOR PRICE AND DELIVERY OR SEE YOUR DEALER  
**UNIT CRANE & SHOVEL CORP.**  
6309 W. BURNHAM STREET MILWAUKEE 14, WIS., U.S.A.





## Contractor Hurries Irrigation Project

(Continued from preceding page)

volt General Electric generator for power. Individual electric motors drive the machine forward, operate small winches to assist in locomotion, and control the travel of a small dump car used in concrete placing.

This small car takes concrete from the main transfer hopper and distributes it to a chuted opening with baffles at right angles to the canal sides. Assisted by Viber electric vibrators, the concrete moves down to cover the sides and bottom of the canal 3½ inches thick. The 6-gage 8 x 8-inch wire reinforcing mesh, placed ahead of the machine by a labor crew, is held at the proper clearance midway in the slab by pipe spreaders which drag along just ahead of the chuted opening.

Contraction joints are cut every 15 feet after seven finishers dress the concrete lining with steel trowels behind the slip form. This joint is then filled with Mastex joint-sealing compound ahead of the main curing operation.

The concrete lining is being cured under subcontract to S. P. Lyons of Los Angeles, who uses his own Sure-Cure white-pigmented concrete-curing solution and a spray rig operated by one man. Three small Briggs & Stratton gasoline engines drive the machine, operate the Sure-Cure sprays, and also mix the Mastex joint-sealing compound used directly behind the finisher.

Due to some trouble with the screed adjustments on the slip form, production had not quite reached the scheduled 750 linear feet in a 9-hour shift when the job was visited. The necessary adjustments were under way, however, and a 405-foot day had been clocked.

### Steel Structure Forms

Included in the Ashbach contract were numerous turnout and wasteway structures. These were built by Queen & Queen, a San Bernardino contractor, under a subcontract. The concrete was furnished by the truck-mixers. Perhaps the most unusual part of this operation was the use of steel form panels, which were used over and over to match the common dimensions of the structures.

### Personnel

The project was designed under the general direction of Walker R. Young, Chief Engineer of the Bureau of Reclamation, with E. A. Moritz, Regional Director of Region III, in charge. His headquarters are in Boulder City, Nev.

(Concluded on next page)

With wire reinforcing mesh in place, a special slip-form machine (first photo) places concrete lining in the Coachella Canal. In the center photo, workman Grant Clark applies Sure-Cure concrete-curing solution. At right, Clark inserts Mastex Joint-Sealing Compound, under pressure, in a contraction joint. Applying this material right behind the joint-cutting machines saved the trouble of digging sand out of the joints later.

C. & E. M. Photos



## No Gears to Shift to Work the Lift

● Here's a mower with hydraulic lift completely independent of tractor gears and clutch. You can raise the cutterbar, let it down, or hold it at any height at the touch of a single valve. You can work it "on the go," or you can stop and lift, lower and go on, without gear shifting.

Heart of this hydraulic control is the engine-driven pump indicated in the circle. It is rigidly connected with heavy seamless tubing—no hoses to deteriorate or loosen. Automatic valve throw-out at top of ram travel affords safety.

This new Case Highway Mower has a sickle that stays in perfect register at any angle of cutterbar from straight up to 45 degrees down. It has double V-belt drive, long-lived automotive-type universal joints, automatic re-lock after break-back. J. I. Case Co., Racine, Wis.



Teamed with the Case "VAI" tractor the new Case hydraulically controlled mower provides exceptionally good visibility, permitting fast work in tall growth where hidden obstacles may be lurking.

Your Case industrial dealer is strategically located to serve you conveniently, staffed and stocked to serve you well. Besides Case tractors and engine units he offers a well chosen line of related equipment such as tractor-mounted loaders, mowers, snowplows, sweepers, bulldozers and scrapers. Specializing in the power and equipment problems that prevail in your area, he has broad experience that can be helpful to you in the choice, use and care of equipment.

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**HOISTS  
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A Complete Line of Builders' Derricks and Winches—nationally known for dependable service and long life.

Write for Catalog or send your problems to our Engineering Department.

The Saagen line is handled by leading equipment distributors everywhere.

**SASGEN DERRICK COMPANY**  
3101-27 W. Grand Avenue, Chicago 22, Ill.

Men who directed construction in the field included C. W. Ashbach, one of the contracting firm's partners, who actively managed the big irrigation construction project. C. M. Steenberg was the General Superintendent, and C. S. Hale was the Construction Engineer for the Bureau of Reclamation.

Much of the country now being traversed by the Ashbach job is under partial irrigation by deep wells. But completion of the job will bring a much-needed auxiliary supply into the region and hasten the day of its ultimate reclamation and irrigation development.

### Measuring Entrained Air: ASTM Papers Reprinted

The reports submitted at its Symposium on Measurement of Entrained Air in Concrete have been reprinted in booklet form by the American Society for Testing Materials. These nine technical papers cover various methods that have been developed to measure the amount of air entrained in concrete. Some of the methods discussed are the rolling and pressure method, the Indiana method, pycnometer method, the Ohio method, and others. One paper gives an analysis of methods based on the percentage of air found in forty-five batches of concrete.

The discussion of each method covers the theory and mathematical formulae involved, as well as a description of the actual method of running the tests. The reports are illustrated with pictures, charts, and diagrams.

The booklet contains an introduction by A. T. Goldbeck, Chairman of the Symposium Committee; a report on studies made by the Concrete Research Division of the Waterways Experiment Station, Corps of Engineers; and a report on the effects of errors which occur during the sampling procedure.

Copies can be obtained by writing to the Society at 1916 Race St., Philadelphia 3, Pa. The price per copy for non-members is \$1.75, and for members, \$1.30.

### Data on Paving Breakers

An illustrated 21-page catalog which describes pavement-breaking equipment is available from the R. P. B. Corp., 2751 E. 11th St., Los Angeles 23, Calif. Catalog No. 8 covers the heavy-duty model, the junior models T, H, and M, and the various breaking and tamping tools for use with these machines.

For each model breaker, there is a photograph and a drawing which shows its principal dimensions and construction features. Text describes the model and its operation and care. A list of specifications covers all parts of the machines. A page is devoted to a picture of the component parts, and this is accompanied by a parts list giving names and numbers.

Two pages of photographs show the various tools which the R. P. B. Corp. can supply, and there is a short description of each part. The tools covered are the square tool, scoring tool, round punch tool, chisel tool, flat tool, lang-shank tamping tool, large tamping tool, and ball tool. Also described is the hammer control valve which is used on all models, and the hammer and valve assembly mounted on a crane and on a shovel.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 60.

### Stone & Webster Expands

Stone & Webster, Inc., has acquired E. B. Badger & Sons Co., of Boston. It made this move in order to expand the engineering and construction activities of its subsidiary, the Stone & Webster Engineering Corp. Both organizations will continue to operate as individual entities for the time being.



C. & E. M. Photo

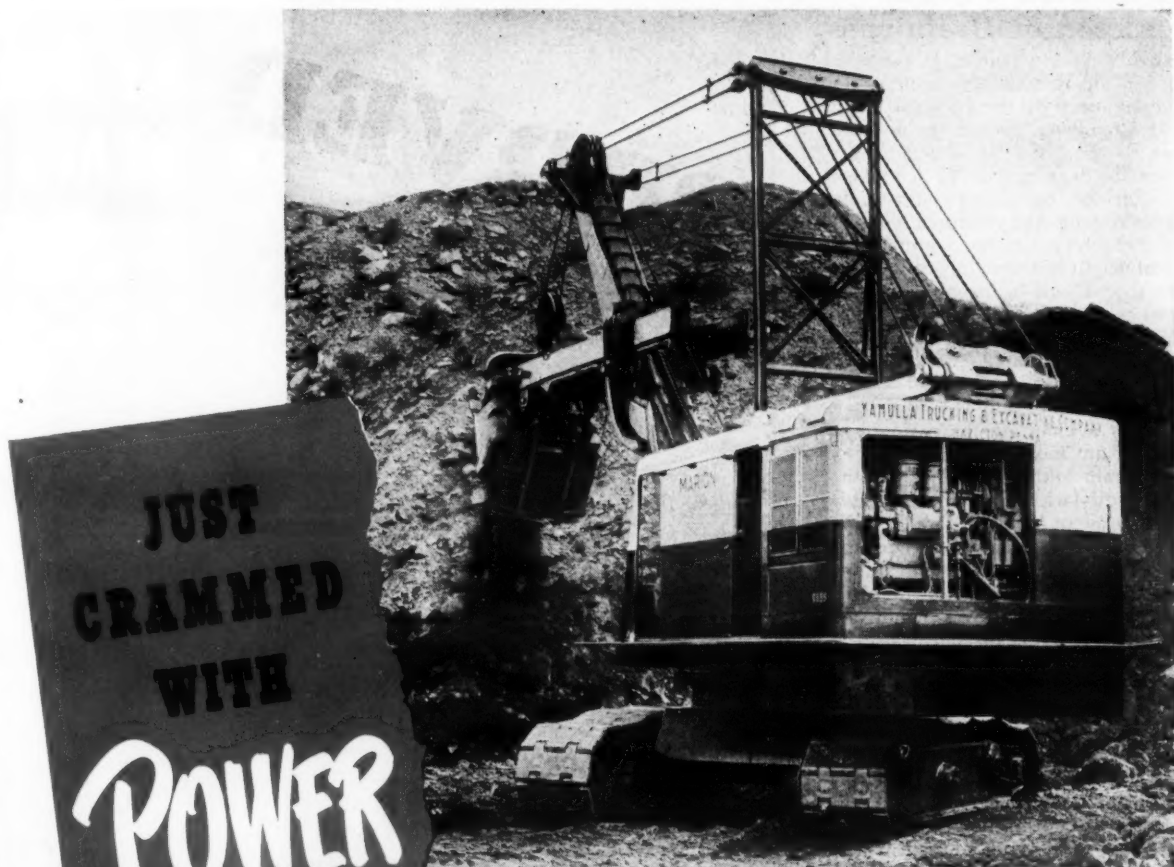
Donald V. Bittenheim (left), General Manager of **CONTRACTORS AND ENGINEERS MONTHLY**, wants details on the batch-plant set-up for the Coachella canal-lining job. He quizzes General Superintendent and Project Partner C. W. Ashbach (center) and Batching Superintendent B. V. Steele of Triangle Concrete Co.

### Wall-Form Construction

A 26-page catalog on its system of wall-form construction is being distributed by the Symons Clamp & Mfg. Co., 4249 Diversey Ave., Chicago 39, Ill. Symons uses the panel system, with one difference: the tie rods are anchored from the sides of the panel, instead of passing through. The manufacturer explains that, when the forms are being taken down, the panels may be lifted straight up as soon as the connecting bolt to which the ties are anchored is removed, and the panels broken loose from the concrete.

The catalog describes the system in detail and gives complete specifications for the materials and equipment necessary. Several hook-ups using the Symons system are illustrated. These forms are available for purchase or they may be rented with a purchase option.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 56.



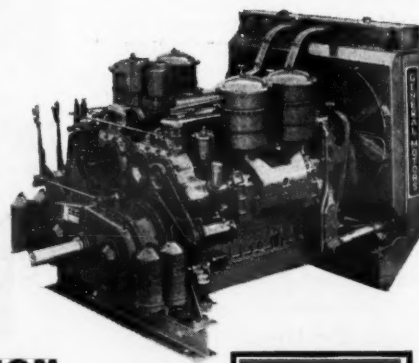
Marion 111-M 3 1/2 cu. yard shovel strip mining for Yamulla Trucking and Excavating Company of Hazleton, Pennsylvania.

JUST  
CRAMMED  
WITH  
POWER

**T**AKE the case of the Marion 111-M 3 1/2 cu. yard shovel. Here's equipment that calls for plenty of power fitted in a compact cab. This is where a General Motors "Twin" does a masterful job, because it makes available 330 husky, dependable horsepower.

Of course, the Yamulla Trucking and Excavating Company like their new shovel. The smooth electric swing, the snappy mechanical scoop, the economy of fuel and the dependability of its GM Diesels would please any shovel operator.

Discover what GM Diesel power can do for you as a prime mover or in fine contractor's equipment. Get the story from your local GM Diesel dealer or write direct to us.



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SINGLE ENGINES... Up to 200 H.P.

DETROIT 28, MICHIGAN

MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS

**DIESEL BRAVN WITHOUT THE BULK**





This is the new Ingersoll-Rand lightweight wagon drill, called the Wagon-Jack. Pneumatic-tired wheels allow it to be transported, set up, and operated by one man. It mounts either the J-50 Jackhammer or the DA-30 drifter.

### Wagon-Drill Design Increases Usefulness

A lightweight wagon drill designed for use in the construction industry has been announced by the Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. Known as the Wagonjack, it is said to combine the drilling stability of a wagon drill with the portability of a Jackhammer. Among the features claimed for this machine by the manufacturer are lightweight construction, centralized controls, and ball-bearing pneumatic-tired wheels—features which permit the machine to be transported, set up, and operated by one man.

The Wagonjack can be used with a J-50 Jackhammer or the DA-30 drifter. It features a chain feed driven by a vane-type air motor. Adjustable anchors permit taking up slack in the chain. A self-locking worm gear is designed to prevent the drill from jumping forward when a soft spot is encountered. Stop bolts equipped with buffer springs prevent over-travel of the drill at the back end of the tower, while the steel-centralizer bracket performs the same function at the front end. Control handles for both the drill and the air motor are grouped on the air-motor mounting, which may be raised or lowered on the tower to suit the operator.

The adjustable mounting is said to permit drilling of holes at any angle from the horizontal to the vertical positions. A universal-type saddle in which the drill tower slides may be moved along the crossbar within the limits of the frame. The tower can also be tilted from side to side. The entire tower may be removed from the crossbar and used on a separate bar or column.

Power from the feed motor is used to raise or lower the frame from the toe-hole position to its maximum height. Positive locking of the frame in any position is obtained by tightening a nut on the end of the crossbar. An adjustable stop which can be clamped in any position is provided for additional safety. The adjustable anchor legs are designed to prevent creeping of the machine when drilling, and to assure a steady set-up on sloping or uneven ground.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 12.

### Hydraulic-Equipment Data

A 16-page catalog about its recently introduced line of hydraulic equipment can be secured from the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa. Items discussed in this catalog are hydraulic power-control units, hydraulic cylinders, hydraulic pumps, gear-type fluid motors, and single and multiple hydraulic control valves.

Each of these units and the models

in which it is made are described in detail in Bulletin A-1152. The power-control units are made in four sizes, the cylinders in three, the pumps in three, and the gear-type fluid motors in four. Photographs show each piece of equipment, and accompanying text describes its principal features and advantages. Engineering data, performance data, and specifications are given in charts, tables, and graphs. Drawings and sectional views are also included.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 52.

### Sisalkraft Sales Mgr. Dies

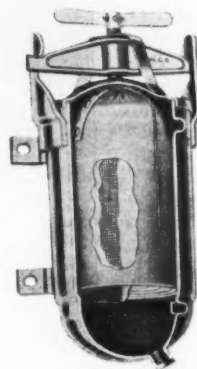
L. W. (Larry) Smith, for many years Sales Manager for The Sisalkraft Co., Chicago, died recently after a long illness. Mr. Smith had been with the company for eighteen years at the time of his death. He is succeeded by W. L. Kennedy, formerly Manager of the New York branch office of the company.

### For all Kinds of Oil and Motors

**MR. FLEET OPERATOR:** When you received your Autocar, Brockway, Buda, Diamond T, General Motors or Mack Motor equipped with a WGB Clarifier, you obtained the best filtration that money can buy—provided you use genuine WGB cartridges, which are covered by patents preventing duplication. But if you use substitutes, which are prevented from using the WGB principle, you cannot expect WGB economy or motor protection.

Descriptive literature sent on request

## WGB Clarification is Economy



The results which have induced manufacturers to equip their fine motors with WGB Oil Clarifiers were obtained by use of the complete unit. It is not WGB filtration unless genuine WGB cartridges are used. Substitutes cost more because they do less. Be fair to yourself, to your motor and to the WGB Clarifier. Use genuine WGB cartridges and you'll get the economy, efficiency and motor protection which the manufacturer intended you to have.

**W. G. B. Oil Clarifier, Inc.**

139 Cornell St.  
Kingston, N. Y.

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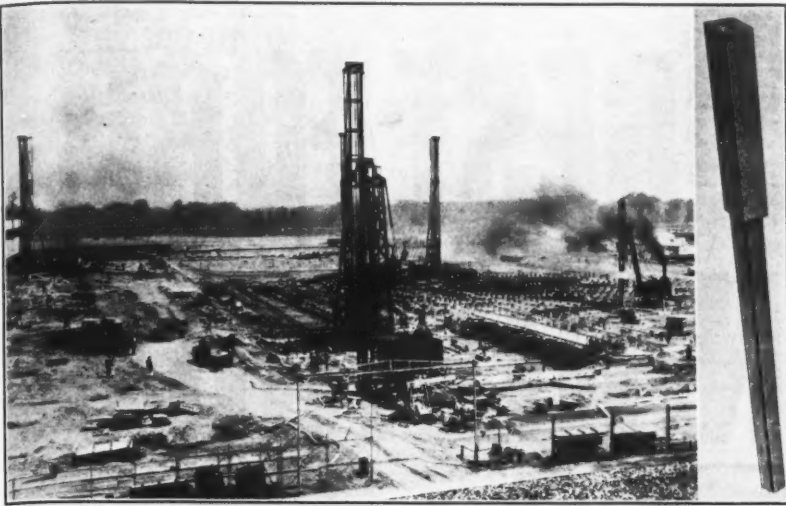


### 5 SIZES

- 12, 10, 8, 6 and 5 Tons
- VARIABLE WEIGHT IN ALL MODELS
- FIVE SPEEDS - FORWARD & REVERSE
- GASOLINE OR DIESEL ENGINES
- MANUAL OR HYDRAULIC STEERING
- MOVING PARTS FULLY ENCLOSED

# INGRAM ROLLERS

**ACME IRON WORKS · SAN ANTONIO · TEXAS**



Pile drivers are at work on steel H-beam foundation piles for the new G-E Turbine Building at Schenectady, N. Y. At right is one of the H-beams encased with concrete to prevent corrosion. They were developed by Western Foundation Co.

### Piles Are Protected By Concrete Sheath

The protection of H-beam piles against corrosion is one of the problems encountered by engineers who wish to specify this type of pile. Two conditions subject the upper section of the piles to heavy corrosion—fluctuation of ground-water levels, and the corrosive acids formed by the action of water on certain fill materials.

In planning the foundations for the new Turbine Building of the General Electric Plant at Schenectady, the Stone & Webster Engineering Corp. was confronted with this problem. A method for scouring and encasing the upper 10 to 30 feet of H-beam piles in concrete was devised by the Western Foundation Co., 2 Park Ave., New York 16, N. Y. Provision is made in this method to pour the concrete encasement in the dry.

On a 12-inch 53-pound H-beam pile, the concrete encasement measures 16 x 16 inches. This affords the metal a minimum of 2 inches of concrete protection on all sides. Any type of pile can be similarly protected, says Western. In the G-E building, 4,666 H-beam piles were used, and all are protected in this manner.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 32.

### Airport Drainage Manual Gives Engineering Data

A 72-page manual on airport drainage has recently been issued by Armco Drainage & Metal Products, Inc., 703 Curtis St., Middletown, Ohio. It is a large booklet—8½ x 11 in size—and has five major divisions covering phases of airport-drainage design. Section 1 deals with the various factors which enter into and influence design; Section 2 deals with the actual design of a drainage system; Section 3 takes up the subject of airport loading; Section 4 shows how to select the proper drain pipe; and Section 5 deals with the installation of the pipes.

Tables, charts, and diagrams accompany the text. Some of the data they give are rainfall intensity and frequency; discharge of pipe based on Manning's formula; depth and spacing of

subdrains; capacity of drain, in cubic feet per second, required to remove

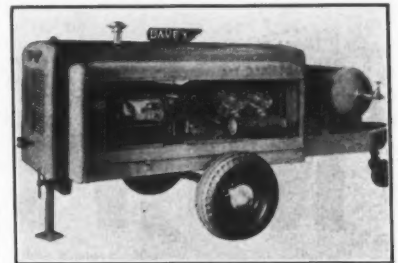
various depths of water in 24 hours; minimum cover over pipes of various diameters; data on sizes and shapes of Armco drainage pipes; the required tensile strength of metal in castings; and others.

The catalog diagrams typical layouts for subsurface drainage, shows various methods of installing drainage pipes and the results achieved by these various methods, etc. It is indexed.

Copies of this literature may be obtained from the company by those engaged in planning, building, or improving airports. Or use the enclosed Request Card. Circle No. 61.

### Trailer Compressor

A compressor with a 160-cfm capacity has been mounted on a 2-wheel trailer by the Davey Compressor Co., Kent, Ohio. Chassis balancing is designed to provide increased handling ease. Known as the Air Chief Model No. 1602-wheel, the unit features a 4-cylinder V-type Davey compressor.



The Air Chief Model 160 consists of a 160-cfm-capacity compressor mounted on a 2-wheel trailer.

According to the manufacturer, it will deliver 160 cubic feet of air per minute at pressures of 100 pounds (125 pounds maximum).

The unit is 153 inches long, 72 inches wide, and 66 inches high. It is powered by a Hercules JXD 6-cylinder gasoline engine. Weight of the unit is 4,300 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 39.

## Another "FIRST" for "QUICK-WAY" TRUCK SHOVELS

with the NEW ALL PURPOSE SCOOP!

FULL REVOLVING CABLE CROWD  
MODEL E  $\frac{5}{8}$  and MODEL J  $\frac{3}{8}$   
CU. YD. CAPACITY  
Interchangeable  
with other  
**"QUICK-WAY" ATTACHMENTS**

The Full-Revolving, Cable-Crowding Scoop is a valuable addition to other "QUICK-WAY" equipment. This full 360° revolving light weight scoop operates as a standard attachment from all angles and in tight places. Standard buckets increase the material handling capacity of your Model E or J "QUICK-WAY" up to 50%; larger buckets available for light materials.

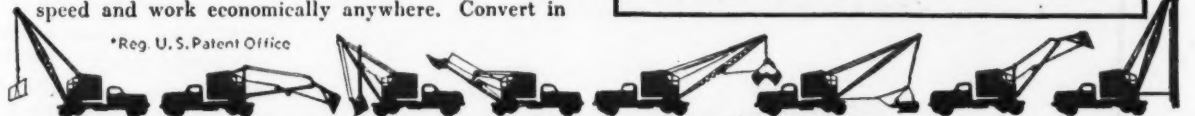
The Scoop has the same rugged simplicity and balanced design found in all "QUICK-WAY" equipment. "QUICK-WAYS" are truck mounted to travel at truck speed and work economically anywhere. Convert in

minutes from Scoop to Shovel, Dragline, Trench-hoe, Crane, Clamshell, Pile Driver or Backfiller. No matter what other equipment you own, you need "QUICK-WAYS" too. There's a "QUICK-WAY" owner near you, ask HIM.

MODEL E: 4/10 cu. yd. cap., mounts on any standard 5-ton truck  
MODEL J: 1/4 cu. yd. cap., mounts on any standard 1½-ton truck

Service available from our Distributors, strategically located throughout U. S. and worldwide.

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For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a "Quick-Way" Truck Shovel.

## "QUICK-WAY" TRUCK SHOVEL CO.

DENVER, COLORADO

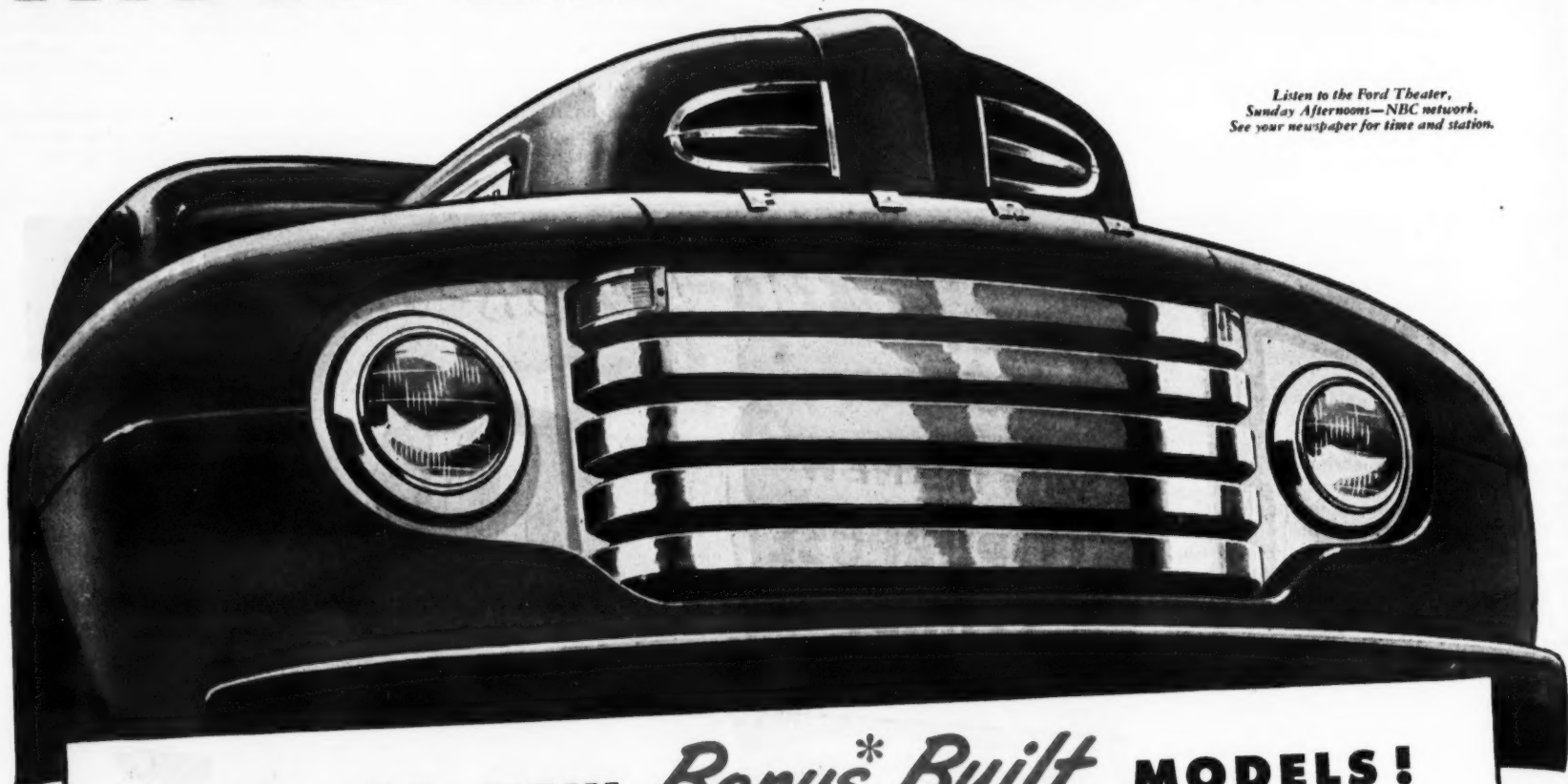
PIONEER IN POWER SHOVELS FOR TRUCK MOUNTING; STILL THE LEADER AFTER 29 YEARS

ROETH



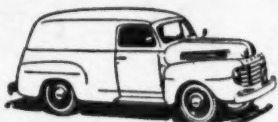
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MOUNTED ON WHEELBARROW CHASSIS  
Write for details and prices  
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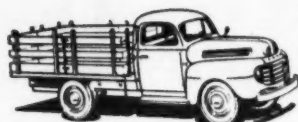


Listen to the Ford Theater,  
Sunday Afternoons—NBC network.  
See your newspaper for time and station.

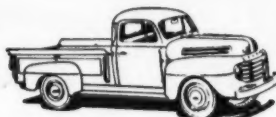
## OVER 139 NEW *Bonus\* Built* MODELS!



**F-1**—4,700 lbs. GVW. 8' Panel, 6½' Pickup, 6½' Platform or Stake, 114" w.b. V-8 or Six.



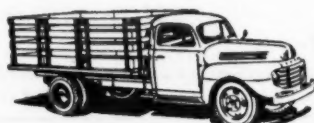
**F-2**—5,700 lbs. GVW. 7½' Platform or Stake, 8' Express. 122" w.b. V-8 or Six engine.



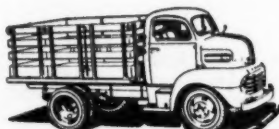
**F-3**—6,800 lbs. GVW. 7½' Platform or Stake, 8' Express. 122" w.b. V-8 or Six engine.



**F-4**—7,500 lbs. GVW. (singles), 10,000 lbs. (duals). 9' Platform or Stake. 134" w.b. V-8 or Six.



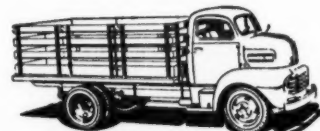
**F-5**—14,000 lbs. GVW. 9' & 12' Platforms or Stakes, 134" w.b. & 158" w.b. V-8 or Six engine.



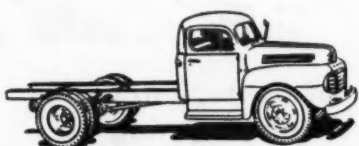
**F-5 C.O.E.**—14,000 lbs. GVW. 9' & 12' Platforms or Stakes. 110"-134"-158" w.b. V-8 or Six.



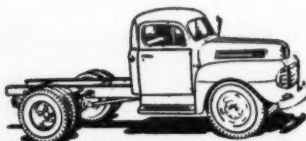
**F-6**—15,500 lbs. GVW. 9' & 12' Platforms or Stakes. 134" w.b. & 158" w.b. V-8 or Six engine.



**F-6 C.O.E.**—16,000 lbs. GVW. 9' & 12' Platforms or Stakes. 110"-134"-158" w.b. V-8 or Six.



**F-7**—19,000 lbs. GVW. 135"-159"-195" w.b. 9.00-20 maximum tires. 145 h.p. V-8 engine.



**F-8**—21,500 lbs. GVW. 135"-159"-195" w.b. 10.00-20 tires 2-speed axle. 145 h.p. engine.

**NEW!** Three new truck engines . . . a new Six and two new V-8's developing up to 145 horsepower!

**NEW!** Living room comfort in the new Ford Million Dollar truck cab! New seats. New 3-way air control.

**NEW!** Two new BIG JOBS rated to carry gross vehicle weights up to 21,500 lbs.!

**SEE YOUR FRIENDLY FORD DEALER TODAY!**

**FORD**  
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**BONUS:** "Something given in addition to what is usual or strictly due."—Webster

**BUILT STRONGER TO LAST LONGER**

**LIFE INSURANCE EXPERTS PROVE AND CERTIFY . . . FORD TRUCKS LAST UP TO 19.6% LONGER!**

## Heavy-Duty Grader Has 100-Hp Engine

A large-size heavy-duty motor grader has been brought out by the J. D. Adams Mfg. Co., 217 So. Belmont St., Indianapolis, Ind. The Model No. 610 grader weighs over 25,000 pounds—without accessories—and has over 18,000 pounds concentrated on the rear wheels to provide ample traction for all conditions. It is powered by an International Harvester UD-16 100-hp diesel.

Features claimed for the Adams No. 610 include: full-floating rear axle; a blade 12 feet long and 31 inches wide; 8 forward speeds ranging from 2.6 to 25.2 mph; and hydraulic brakes on all four tandem drive wheels. The tandem wheels are equipped with 14.00 x 24 tires, and the front wheels have 11.00 x 24 tires. The two-piece cab provides an inside height of 6 feet 3½ inches. New improved power controls are designed to give increased blade-lifting speed and easier operation. The machine uses a combination mechanical-hydraulic steering mechanism. It is equipped with push-button electrical starting.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 28.

## Corrosion Handbook

A new book in the field of corrosion, "Corrosion Handbook", has been published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. It was edited by Herbert H. Uhlig, Associate Professor and Director of the Corrosion Laboratory, Department of Metallurgy, Massachusetts Institute of Technology. It incorporates the work of 100 authorities in the field, and was prepared under the auspices of the Electrochemical Society and the Society's Corrosion Division. Its purpose is to provide a summary of information covering all phases of corrosion. It includes within its scope a cross section of scientific data and industrial experience.

The major contents of this 1,192-page handbook deal with corrosion prevention and the behavior of metals and alloys in various environments and at both ordinary and extreme temperatures. Emphasis is placed on quantitative rather than qualitative data. It discusses the theory of corrosion; corrosion in liquid media, the atmosphere, and gases; special topics about corrosion, such as corrosion by sea water or by soils; high-temperature corrosion; corrosion-resistant materials; corrosion protection; corrosion testing; and miscellaneous information.

The book contains a glossary of terms and a 26-page index for quick reference. It is full of charts, tables, and diagrams designed to illustrate and amplify the text matter. The book sells for \$12.00.

## Lincoln Electric Ups Two

J. S. Roscoe has been appointed District Manager for its Chicago office by The Lincoln Electric Co., Cleveland, Ohio. Mr. Roscoe comes to Chicago from Pittsburgh, where he had been District Manager since 1944. He is succeeded as Pittsburgh District Manager by H. E. Cable.



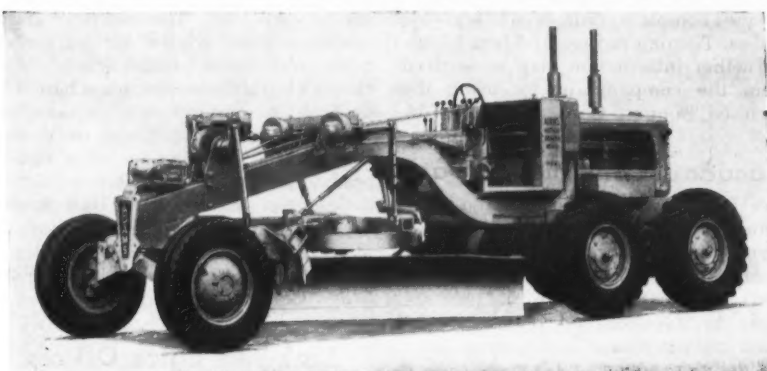
**STERLING LIGHT PLANTS**

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SIMPLE—DEPENDABLE—RUGGED  
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The new Adams Model 610 motor grader is powered by an International Harvester UD-16 100-hp diesel engine. Its blade is 12 feet long, 31 inches wide. And the grader weighs over 25,000 pounds without accessories.

## Welding-Products Catalog Shows How to Cut Expense

A 28-page catalog which describes its complete line of welding products has been put out by the American Manganese Steel Division of the Amer-

ican Brake Shoe Co., 389 E. 14th St., Chicago Heights, Ill. It covers the use of welding to cut down expenses in the war against wear. The Amsco welding products serve by providing a protective hard facing or by reclaiming and rebuilding worn or damaged equipment

parts. This function is stressed throughout Bulletin No. 1047-W.

One page of the catalog is devoted to each type of Amsco electrode or welding rod. On this page will be found information on the composition of the material, its identification, current requirements, and a list showing the diameters and lengths in which it is stocked. Text matter discusses the physical and chemical characteristics of the products. Photographs show some typical examples of how these particular rods and electrodes can be used.

Some of the miscellaneous products discussed in this bulletin are the Amsco hard-surfacing flux, dipper-tooth re-pointers or wedge bars, weldments, and others. A special feature of the publication is an alphabetized list of applications for the Amsco welding products. This list is arranged by industries, and tells where the Amsco products can be used in each industry.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 80.

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Ottawa Industrial Loaders and their attachments are enabling State and County Highway Departments as well as other Industrial tractor owners to cut operation costs over 1/2 on both light and heavy tractors. Keep your tractors working all year 'round. Put them to work on these jobs when they would normally be idle.

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4. Backfilling and leveling of roadway shoulders with light dozer blade.

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**STEEL PRODUCTS, Inc.**  
INDUSTRIAL DIVISION  
OTTAWA, KANSAS • U. S. A.

## Bottom-Dump Wagon Has 25-Yard Capacity

A bottom-dump earth-mover with a 25-cubic-yard struck capacity has been added to its line by The Euclid Road Machinery Co., Chardon Road, Cleveland 17, Ohio. It is designed for operations requiring big yardage production, such as airports and earth-fill dams. Power is furnished by a 275-hp Cummins Model NHBS-600 diesel engine. The unit can carry a total pay-load weight of 78,000 pounds, the manufacturer states. Heaped capacity at a 3 to 1 slope is 29.7 cubic yards.

The tractor for the Model LDT bottom-dump Euclid has a wheelbase of 11 feet; an overall length of 19 feet 9 inches; an overall width of 10 feet 8 inches; a height, to the exhaust stack, of 11 feet 6 inches; a clearance under the front axle of 1 foot 1½ inches; and a rear-axle clearance of 2 feet 3½ inches. The earth-mover has a width of 11 feet 7½ inches, and an overall length of 34 feet 1 inch. Overall length

of the complete unit is 48 feet 5¾ inches. Turning radius is 34 feet 1 inch.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 44.

## Macadam-Construction Data

A folder which describes the construction of macadam pavements has been prepared by Macadam Pavements, Inc., a technical group organized for research and engineering study to improve and develop macadam pavements.

The folder opens with a brief description of what a macadam pavement consists of and how it is built. It then goes into the details of construction. It covers the base course, the application of screenings, the difference between dry or waterbound macadam, and the application of a bituminous wearing course.

Illustrations show each step as it is being performed, and captions list recommended makes of equipment for

use in each step. The last page shows cross-sectional views of pavements built and under construction. One shows a bituminous-macadam base with an asphaltic-concrete surface; another, a 4-lane heavy-duty truck route; and a third, the building up of a traffic-bound road with bituminous macadam.

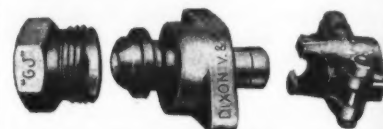
Copies of Informational Bulletin No. 4, giving a full description of the above methods, may be obtained by writing to the association at 1018 Huntington Bank Bldg., Columbus 15, Ohio.

## Link-Belt Sales Offices

The Link-Belt Co. has established sales offices in Charlotte, N. C., and Louisville, Ky. The district sales office in Charlotte is located in the Johnston Bldg., and is under the direction of Thomas H. Appleton, formerly District Sales Engineer at Baltimore, Md. The Louisville office is located at 136 So. 4th St., and is under the supervision of Emmart LaCrosse, Jr., formerly District Sales Engineer at Indianapolis.

## Built to Cut Costs on Heavy Duty Air Tool Operations...

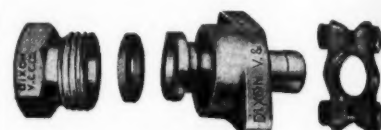
DIXON quality in Air Hammer Couplings assures definite savings on rock drilling and other heavy-duty air tool jobs... longer service life through superior strength and durability; greater efficiency through elimination of leaks and pressure losses; lower hose replacement costs through protection to hose ends.



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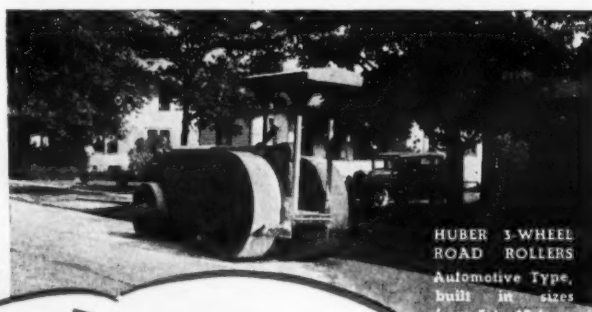
The moment you put Huber Road Machinery to work, you will discover three things, like many road men have done.

**FIRST**—you will find that Huber's practical design—the result of 35 years experience in close contact with road men, readily measures up to the job it has to do.

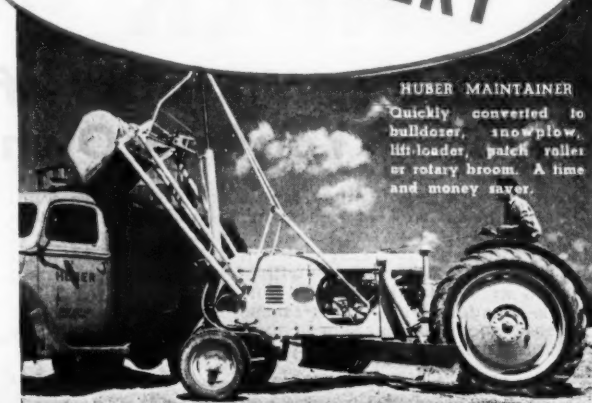
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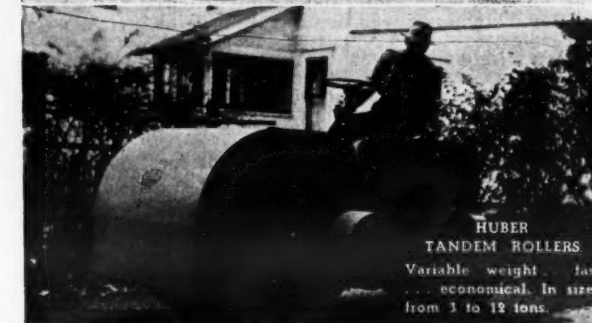
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**MAINTAINERS**

# How to Cut Accident Losses Sixty Per Cent

## Analysis of Operations At the Design Stage Will Expose Potential Hazards So They Can Be Controlled

By F. J. CRANDELL, General Chairman, Construction Section, National Safety Council, and Assistant Vice President, Liberty Mutual Insurance Co., Boston

THE construction industry is in no position to be complacent about its safety record. True, it is safer today than at any time in the history of the industry for a worker to do his work. The equipment furnished him is designed to protect him against injury. And operations are designed to eliminate as many accident interruptions as possible.

True also, accident frequency in the industry has dropped one-half during the last few decades—as a glance at the graph on page 82 will show. And the average compensation rate throughout the country has dropped in almost direct proportion to that lower frequency.

But the same graph reveals one trend that should be disturbing to the industry. During the period shown, the cost per compensable accident has risen from about \$350 to \$500.

The economic reason for the jump is obvious. It reflects the increase in the cost of living, and the generosity of the compensation commission has increased to allow the injured workman to be cared for adequately. But this trend alone means that the construction industry must double its efforts to reduce accidents and protect the workman—if it would reduce its costs.

### Causes of Accidents

The first effort should be, of course, to pin down the causes of accidents—the basic causes, not just the apparent and more immediate causes.

To illustrate, let us look at the case history of an accident whose immediate and apparent cause was a fall. Close scrutiny of the accident, and the diagram of it that appears on this page, will reveal that the fall was itself just a result of the basic cause.

The job consisted of erecting steel members. The accident—in this case, the fatality—overtook two men of a four-man team of "bolter-ups" whose job it was to bolt the steel members temporarily as soon as they were set in place.

A derrick boom was placing the members. It had set all first-floor members that it could reach, and was filling in, making the closure, in the bay in which it stood. Meanwhile, to prepare for jumping the derrick from the basement floor to the first floor, two jump timbers had been placed near the derrick to span the bay being worked.

A beam that was to be used as one of the members to fill in the bay was off to one side on the basement floor. Before it could be picked up, it had to be snaked out into position. Accordingly, the derrick's load fall was brought over under the loose jump timbers and a hitch put on the beam. The slack was taken up in the fall, and the beam began to move into the bay along the basement floor. Two men were standing up above on the jump timbers, waiting for the beam to be picked up.

As the weight of the beam increased the pressure of the load fall against the inside jump timber, which it was touching, the timber tipped and pitched the two men who were standing on it onto the floor below.

The cause of this fatality? A fall, yes. But a fall caused, in turn, by a job

procedure which had not been completely thought out by the man in charge of the operation. And a secondary cause may be attributed to the workmen's procedure—to the fact that they were standing on the jump timbers.

These are two causes found to be basic in many accidents in the industry: incomplete design of operations, and incorrect procedure of workmen.

### Where to Attack the Problem

The way to control 60 per cent of the accident losses that occur in the industry is through advance analysis of job operating procedures. This figure is based on a close study of about 1,000 serious and non-serious accidents involving losses of \$60,000. The causes attributed to these accidents, and the

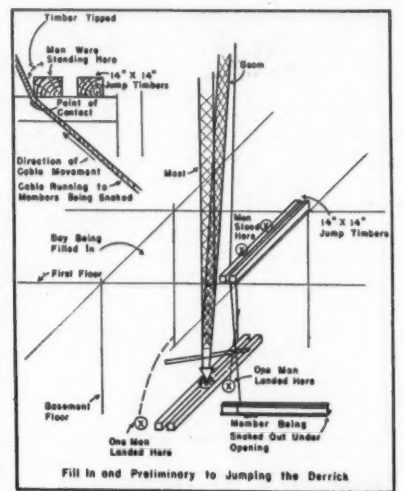
per cent of loss for which each was responsible, follow:

Causes of Accidents	Per Cent of Losses
Incomplete operating procedures	60
Workmen's procedure	15
Failure of temporary structures	13
Inherent engineering hazards	10
Occupational disease	2

Though this particular study was made in the building-construction phase of the industry, other studies in other phases of the industry have led to roughly the same conclusions. And these conclusions make it clear that if we are to reduce accident losses in the industry, we should study job operations at the design stage.

### Advance Analysis

There are some organizations that design operations in the executive offices. But as a rule, superintendents and their operating foremen are responsible for such designing in the construction industry. These men face the difficulty of producing a new product on almost every job. In addition, they

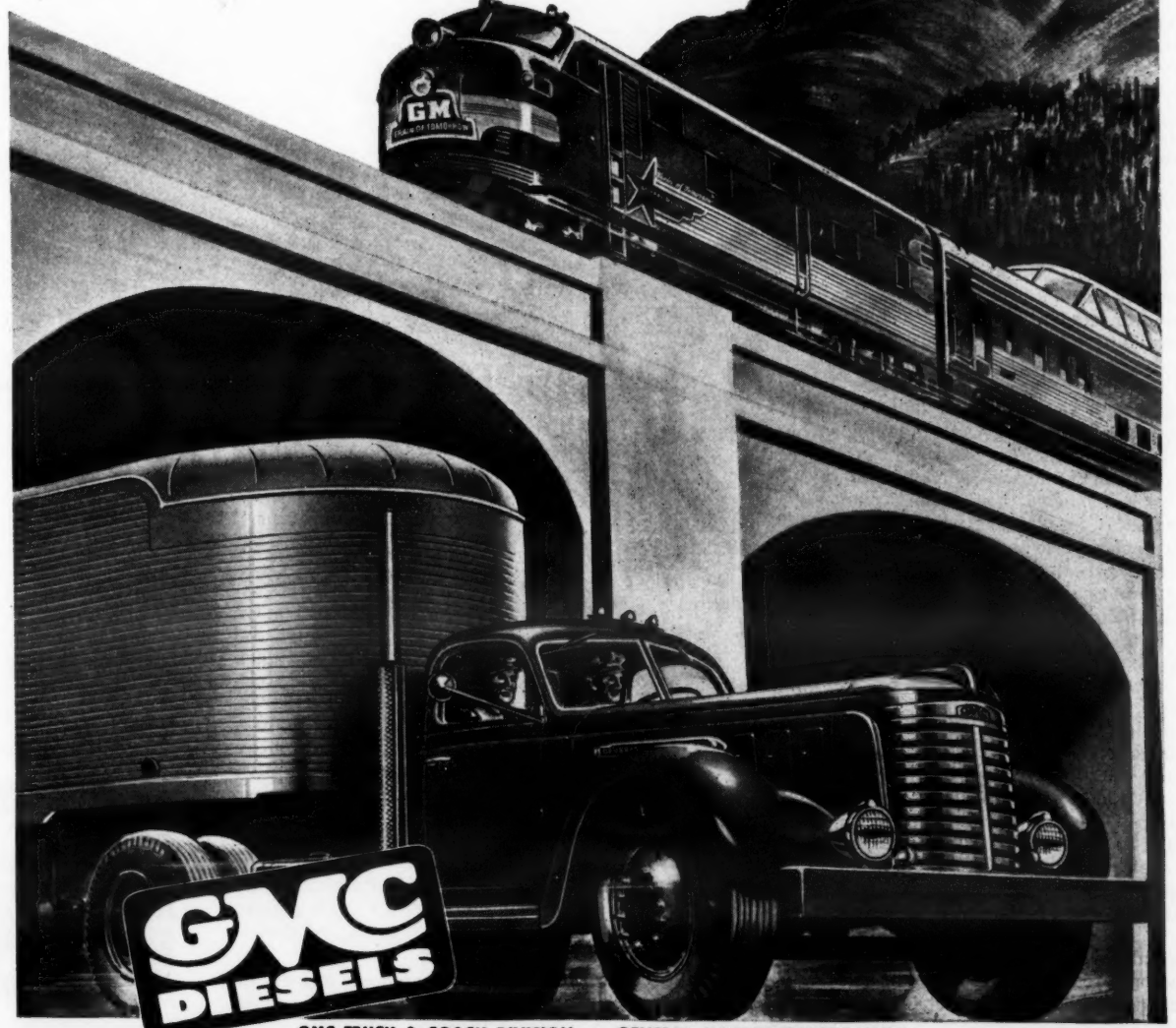


must adapt the equipment they are provided with to the product that must be made.

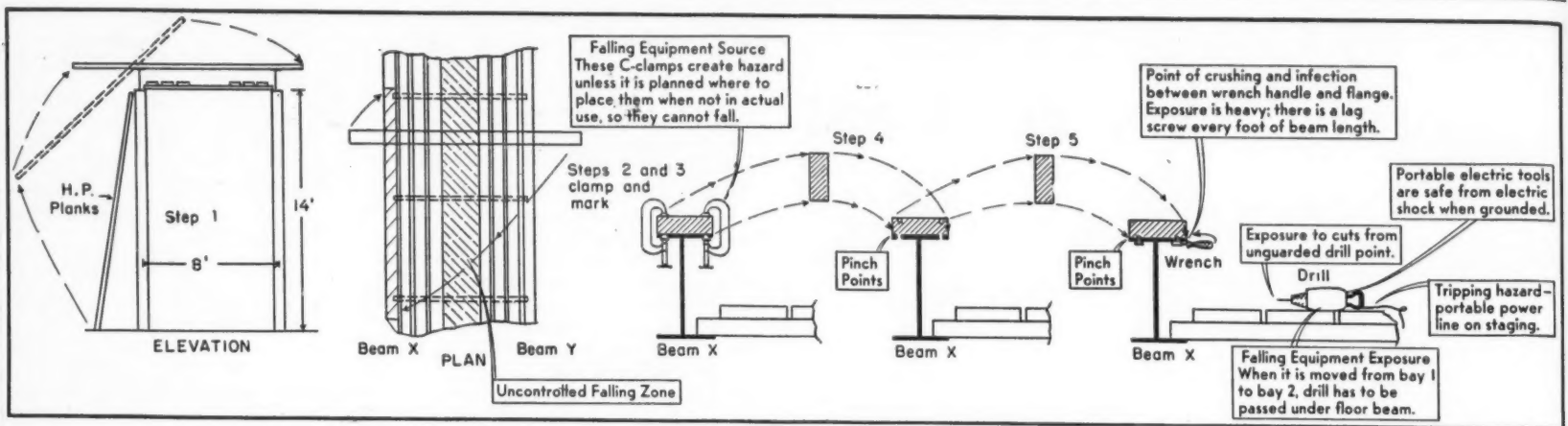
Now many safety engineers are trying  
(Continued on next page)

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## How to Cut Accident Losses Sixty Per Cent

(Continued from preceding page)

to help reduce construction losses by analyzing the operations which these men design *before the actual job begins*. This procedure is called "advance analysis".

First, the operation is recorded as it has been designed by the superintendent, foreman, or executive. (In the writer's opinion, the average operation in the construction industry is too difficult to be designed mentally and should be recorded under any circumstances.) Then the safety engineer, with his knowledge of accidents, studies the exact procedure and movement within the operation to determine what accident causes exist there and exactly where an accident may take place. From then on, elimination or control of the accident causes becomes a co-operative enterprise between the safety engineer and the operator.

At times it is possible to redesign operations to eliminate causes. At times it is not. But even when accident causes cannot be eliminated, advance analysis serves this valuable purpose: by means of it, the operator can present to the men the hazards that exist in the operation. They, in turn, are better able to handle themselves and adapt their procedure so they will not be involved in an accident due to their own movement.

Let us look at the recorded designs of two different operations and see what potential accidents advance analysis would uncover in them.

### Sample: Attaching Sleeper to Beam

The first is the operation of attaching 3 x 8-inch sleepers to an I-beam. You will notice, if you study the plan which appears on this page, that Step 1 calls for workers on a staging to haul the hard-pine planks from the floor below by hand. The hazard of an uncontrolled falling zone shows up at once in the design—with the likelihood of accidents from equipment falling on men below.

In Step 2, the pine plank is placed on the top flange of the I-beam and temporarily fastened there with C-clamps. Unless it is planned where to place these clamps so they cannot fall when not in actual use, the chances of an accident are obvious.

In Step 3, the plank is marked for drilling through punch holes in the top flange of the beam. In Step 4, it is unclamped, turned over on the same beam, and stop-drilled as marked, with a portable electric drill. Then in Step 5, the plank is turned back on the same beam and lag-screwed to the I-beam from under the top flange, using a ratchet socket wrench.

The danger of falling equipment persists throughout the operation—especially with the electric drill, which must be passed under the floor beam as it is moved from the first to the second bay. The drill power line on the staging creates a tripping hazard as well as the hazard of electric shock if the tool is not grounded. And the

unprotected drill point can easily cut the workers.

Moreover, turning the plank over in Steps 4 and 5 creates the hazard of pinched hands and fingers. And the design of the operation shows up a heavy exposure to hand crushing and infection at the point between the

wrench handle and the flange.

Advance analysis of this operation shows that management can do a great deal to reduce accidents and consequent losses. The type of wrench used to install the lag screw will materially determine whether or not the men will suffer crushed fingers; an off-set

wrench would probably eliminate this accident cause.

It is definitely up to management to ground the electric drill; that is a determination the men cannot make themselves. And it is up to management to plan some way to handle the

(Continued on next page)



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pits, floors, walls, windows, skylights, etc., 10 times faster than by hand methods.

Hypressure Jenny is compact, portable, safe, easy and economical to use. Ordinary labor can operate it. A full powered model may be had for as little as \$348.00.

Why not put Hypressure Jenny Steam Cleaner to work for you? We'll gladly send you complete details and the address of your nearest dealer. Write today.

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HOMESTEAD VALVE MANUFACTURING CO.

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CORAOPOLIS, PA.

# Pouring Floor Slab Procedure

drill from one bay to the next, in order to prevent falling equipment, injury to men below, and damage to the equipment itself.

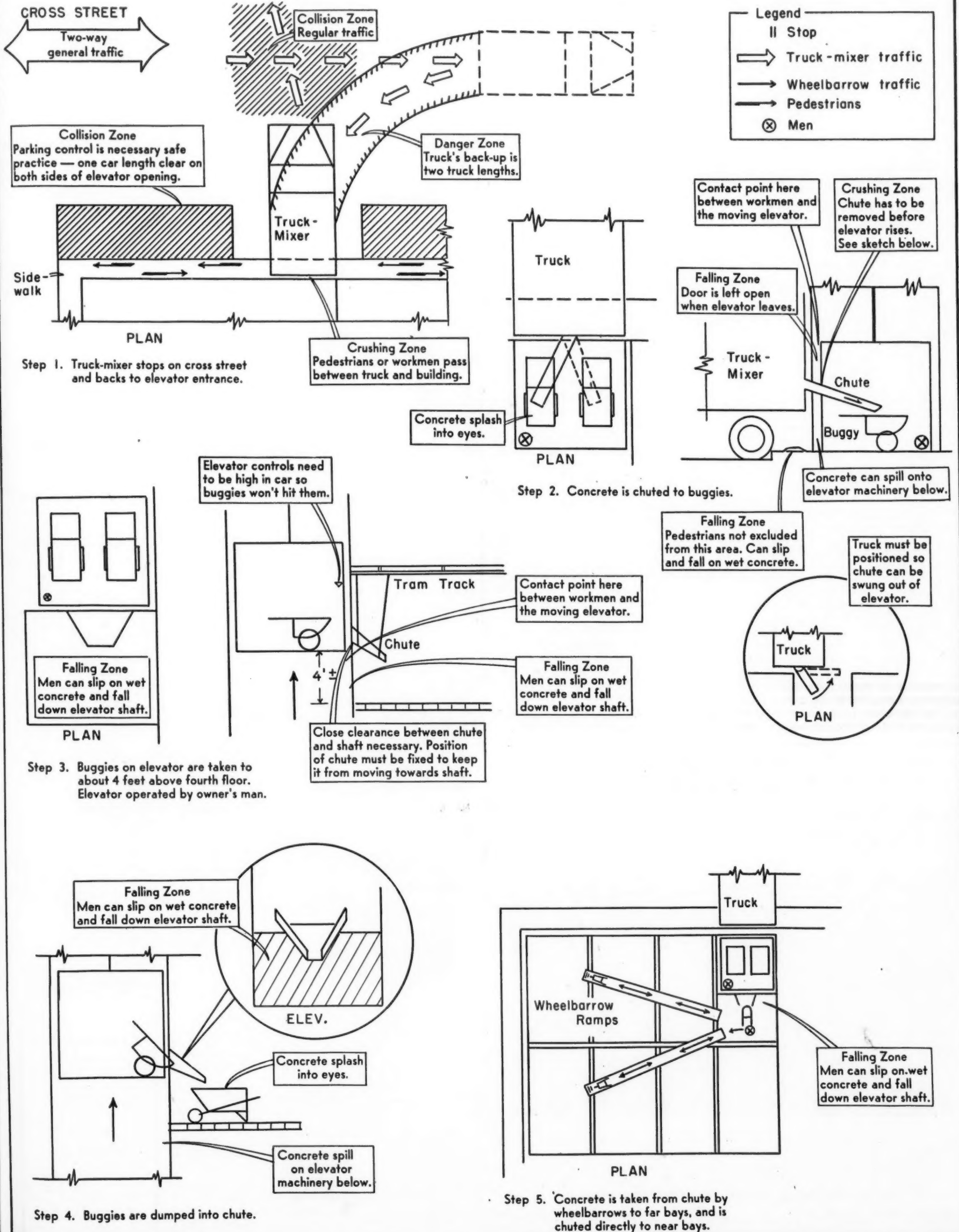
## Sample: Pouring Floor Slab

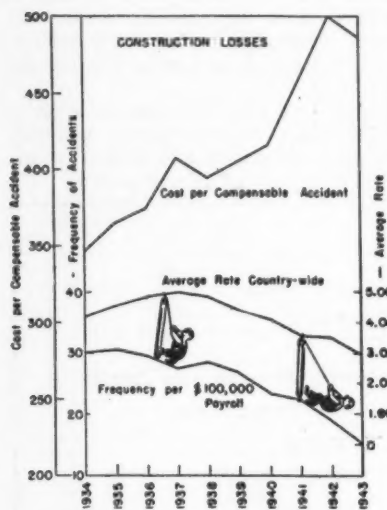
A somewhat more difficult problem with greater hazards is involved in the

second study—the pouring of a floor slab. This operation includes so many variables that it would be almost impossible to study it mentally and arrive at anywhere near a complete design. But recording the operation step by step as in the accompanying chart, then analyzing it before it is put into effect,

will disclose its accident areas, will show where the design is incomplete, and will result in a safer job for the workmen.

Step 1 in the operation calls for a truck-mixer to back up to a building, to the entrance of an elevator which  
(Concluded on next page)





## How to Cut Accident Losses Sixty Per Cent

(Continued from preceding page)

will carry the concrete up to the floor being poured. (Adapting equipment to work for which it was not designed is a special problem of this job.) Two accident zones show up at once. A collision zone first of all, for there is danger of the truck-mixer colliding with two-way traffic in the street as it stops and backs up two truck lengths to the entrance; there is also danger that it will collide with parked cars unless one car length is left clear on either side of the elevator entrance. A crushing zone next, for pedestrians and workmen are not excluded from the area between the rear of the truck and the building.

In Step 2, concrete is chuted from the truck-mixer to buggies in the elevator. Aside from the obvious hazards of concrete splashing into workmen's eyes as it drops into the buggies, or spilling down the shaft onto the elevator machinery below, several more serious dangers show up at once. Workmen may be harmed at their point of contact with the moving elevator; and they can fall down the shaft when the elevator leaves, if the doors are not closed at once. Moreover, the truck must be spotted so that the chute can be swung out of the elevator; otherwise it may be crushed as the elevator rises. And pedestrians passing between the truck and the building are further exposed to the hazard of slipping on the wet

concrete and falling.

Similar hazards exist in Step 3, when the buggies of concrete on the elevator are taken to about 4 feet above the fourth floor. Workers are again exposed to the danger of contact with the moving elevator, of slipping on wet concrete and falling down the shaft through the 4-foot opening. In addition, the elevator controls must be high enough in the car to prevent the buggies from hitting them accidentally. (It should be noted here that the elevator is operated by an employee of the building owner.) Advance analysis also reminds the man who is responsible for the operation that a fixed position of the chute is necessary to keep it from moving towards the shaft and being crushed or spilling its contents on the elevator machinery below.

In Step 4, the buggies dump the concrete into the chute. These hazards persist: concrete splash into workmen's eyes, or concrete spill onto the elevator machinery below. And workers will move around the buggies and chute at the risk of slipping and falling down the 4-foot opening below the elevator.

The same unprotected falling zone exists during Step 5, as the concrete is taken from the chute by wheelbarrows to far bays or chuted directly to near bays.

### Only One Time at Bat

In jobs like these—in all his jobs—the contractor has only one time at bat. Unless he analyzes his project in detail before he starts, its accident causes and potential losses to him will be in existence throughout the operation. And once the operation has begun, it is uneconomical to change procedures.

Advance analysis, by allowing a detailed study before the operation begins, is an insurance against an incomplete operation—and therefore an insurance against 60 per cent of the losses that occur in the construction industry due to accidents.

It must be remembered that this is a cooperative enterprise between the safety engineer and the operating designer. Whether that designer is the superintendent, the foreman, or the executive of the company, the safety engineer's knowledge of accidents must be incorporated into the design if we are to reduce the industry's losses.

An accident that hasn't happened in 20 years can happen in 20 seconds.

## ... YES ...

This contractor owned a conventional Subgrader but he chose to use his Caterpillar Grader with ROADGRADER GAUGES attached because the combination is faster, more flexible and prepares a superior finegrade at a lower cost.



Equip your Grader with a set of ROADGRADER GAUGES and let them prove their worth to you. They will save you money on your shortest or longest paving job. For further information write to:

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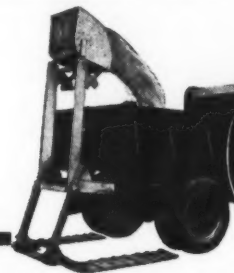
## Lamps for Bridges, Piers

A catalog on lamps for bridges and piers is being distributed by the Armspear Mfg. Co., 1270 Sixth Ave., New York 20, N. Y. These spheroidal-lens cast-aluminum lamps are thoroughly described in the bulletin.

The bridge and pier lamps can be

furnished for use with electric or oil source. Electric lamps are available with an oil emergency feature. Engineering drawings in the catalog show dimensions and illustrate construction features.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 74.



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One-man  
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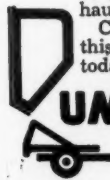
The Monroe Corporation, builders of the 10-million-dollar Windsor Village in Indianapolis, bought one Dumpcrete last July and a second in August. These

"paid for themselves in 18 weeks." No wonder they bought two more.

They're placing better concrete at lower cost. Air-entrained concrete is picked up at local ready-mix plant at low price, hauled 3½ miles to job in economical Dumpcrete, chuted quickly to form or onto slab.

Dumpcreters are doing a better job than truck mixers without the expense, and without idle time. Monroe says, "Our concrete bodies are busy every day. When it is cold or wet, they haul sand and gravel."

Concrete men in 41 states are saving just like this with the Dumpcrete. You can too. Write today for 8-page booklet.



### DUMP CRETE

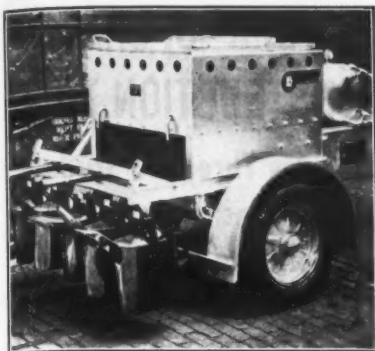
DIVISION

MAXON CONSTRUCTION CO., INC.  
441 Talbot Bldg., Dayton 2, Ohio

### The Dumpcrete Body

Lightweight, watertight, loads fast, dumps fast or slow, places anywhere, costs less to buy and run. Ideal for hauling aggregate, coal and earth.

\* Dumpcrete Concrete is central-mix air-entrained concrete hauled and placed with the speedy, low-cost Dumpcrete. Provides top-quality, plastic, workable and non-segregating concrete, saving up to \$1.00 per yard.



Above the heating compartment of the improved Littleford Model 90-AC tool heater, there is a 50-gallon-capacity kettle for heating asphalt or tar.

### Tool-Heating Units In Improved Models

Two improved models of its tool heaters have been made available by Littleford Bros., Inc., 485 E. Pearl St., Cincinnati 2, Ohio. The Model No. 90-X tool heater is mounted on a 2-wheeled pneumatic-tired chassis which is equipped with automotive-type springs. The heating compartment contains ribbed cast-iron liners on each side and the bottom. These are designed to facilitate the sliding-in of tools, and also to provide a better circulation of heat underneath the tools. Heat is supplied by two Littleford vaporizing-torch-type burners, rated at temperatures up to 2,200 degrees F. Directly above the heating compartment there is a grill arrangement for use in heating asphalt-pouring pots or buckets.

The Model No. 90-AC is of the same construction as the Model No. 90-X, except that directly above the heating compartment there is a kettle for heating asphalt or tar. It is equipped with a draw-off cock at the side, and has enough hose to fill a pouring pot resting on the ground. Capacity of the kettle is 50 gallons. When the tool-heating compartment is used, cast-iron liners isolate the kettle from the heat. And when the heat is to be applied to the kettle, the liners are pulled into the out position to heat both the tools and the kettle.

Both models have a locking arrangement at the rear to hold tools in place while trailing. Special hooks are available for hanging pouring pots. A retractable stiffleg is used when the heater is on location, and is pulled up when the unit is being trailed.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 40.

### New Safety Harness

Safe working conditions are a part of job efficiency. It is especially important that men working suspended in the air, on hazardous jobs, have the proper equipment to protect them against the danger of falls. A safety harness for this purpose is made by the Buckingham Mfg. Co., Inc., of Binghamton, N. Y.

This harness consists of a rigid seat which is hooked into a saddle, and is designed to provide a non-confining seat from which to work. The chest harness is attached to a clamp well up on the supporting rope or cable, so as not to interfere with the workman's freedom while he is wearing it.

The belt is made of 4-ply cotton webbing, moisture-proofed and mildew-resistant. It is fitted with a ring and a snap fastener for carrying tools and accessories. All D-rings are drop-forged. The wood seat is 15 inches long and 5 1/4 inches wide. The safety hook is hand-forged from quality steel. It is provided as a separate unit, but one end of it may be permanently attached to the belt by closing its small eye around the D-ring. The open end is said to be safeguarded against release, and yet to be easily disengaged.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 49.

### Carbon Black's Effects On Air-Entrained Concrete

Carbon-black emulsions have been used for a good many years to color the concrete used in center stripings and passing lanes, etc., to distinguish it from plain concrete. But the advent of air entrainment created a problem in its use, for normal percentages of entrained air were not obtained when carbon black was used in the concrete. For example, it was found that the percentage of air-entraining agent which would normally entrain 5 per cent of air in regular concrete, would entrain only 2 per cent or less in concrete which contained finely divided carbon-black dispersions.

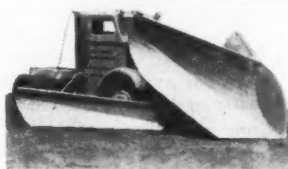
It occurred to chemists who were studying this tendency of carbon black to inhibit the formation of entrained air, that the selective adsorption of the air-entraining agent by carbon black was very largely dependent upon the size of carbon particles. Tests conducted by the Research Division of the Dewey &

Almy Chemical Co. showed that above a certain minimum size such selective adsorption was minimized to the point where its effect was not of any consequence.

Current findings show that the new carbon-black dispersions, while giving a satisfactory color value, will have no effect on the action of air-entraining agents normally employed in concrete today.

### Southern Representative Appointed by Galion

J. H. Tiller, Jr., has been named District Representative by The Galion Iron Works & Mfg. Co., Galion, Ohio. He will handle motor graders and rollers in the south-central area. This territory covers Louisiana, Mississippi, Alabama, and Arkansas. Mr. Tiller will make his headquarters at Jackson, Miss.



### There's Always a BEST WAY

That goes for snow clearance, too. It's no more accident that

### DAVENPORT-FRINK SNO-PLOWS

enjoy engineer-preference throughout the snow belt. They have won their spurs through Faster • Safer • Cleaner Snow Removal.

### PLAN AHEAD

The best time to think about increased efficiency for next year is NOW when the recent snow and ice conditions are still fresh in your mind. We'll gladly supply complete information.

### DAVENPORT BESLER CORP.

Dept. A

Davenport, Iowa

Made in Eastern U.S.A. by CARL H. FRINK, 1000 Islands, CLAYTON, NEW YORK



*Here's NEW BEAUTY  
That Helps Me Sell Concrete!*



"Yes, Sir . . . on every trip, the new 1947 Smith-Mobile's handsome appearance helps advertise my business . . . virtually acts as my concrete salesman."

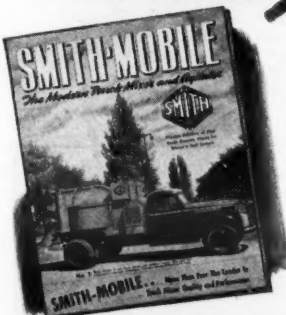
Smith-Mobile's beauty is achieved largely by functional styling. Mixer engine, transmission, water pump, valve system and all moving parts are completely enclosed in a streamlined housing. And these improved Smith-Mobiles are easy to keep handsome . . . easy to "hose off" between trips. The roomy charging chute prevents spill-

ing of dry aggregates or cement. And the perfected drum closing door seals batch in drum . . . keeps concrete from seeping out in transit.

Improved performance goes along with new beauty. Drums are larger, yet overall weight is materially decreased. Dual water injection system prevents freezing in cold weather. Direct-connected motor has 3-point suspension. Simple, lightweight transmission is foolproof. Drum rides on Timken Roller Bearings in rubber-cushioned case.

New 4 1/2 and 5 1/2 yard sizes now available. Smith-Mobiles can now be obtained in 4 popular sizes . . . either truck mixer or agitator. Get the complete Smith-Mobile story — today. Write for Bulletin No. 230.

THE T. L. SMITH COMPANY, 857 N. 32nd Street, Milwaukee 10, Wisconsin, U. S. A.



**New Bulletin Just Off the Press!**  
Gives you all the facts, dimensions and specifications of the improved SMITH-MOBILE models. If you haven't already received yours, be sure to ask for a copy.

# SMITH MOBILE

*The Original High Discharge Truck Mixer and Agitator*

## Concrete Admixture Has Asphaltic Base

A new admixture for concrete has been announced by the American Bitumuls Co., 200 Bush St., San Francisco 4, Calif. It is designed to reduce water absorption, with subsequent reduction in concrete expansion and contraction; to improve the dispersion of cement; to increase the ability of concrete to absorb shock without breaking; and to afford protection against alkaline or neutral-salt attack and destructive gases. It is described as an aqueous suspension of colloidal asphalt. It is a brown, slightly viscous liquid.

Hydropel can be poured, or it can be transferred from its storage place by an open impeller type of centrifugal pump. During concrete mixing, Hydropel is substituted for a portion of the water at the rate of 1½ gallons of Hydropel for each sack of cement. For normal mixes, this will take the place of the same amount of water—gallon for gallon. This ratio can be adjusted

for special mixes. The additive can be supplied in 5-gallon pails, 30 and 55-gallon drums, and in tank cars or trucks.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 33.

## Light and Power Unit

A fully automatic light and power plant is made by the Universal Motor Co., 428 Universal Drive, Oshkosh, Wis. It is said to provide a 1,750 to 2,000-watt 115-volt 60-cycle alternating current. The plant is designed to start automatically whenever any light or appliance of 25 watts or more is turned on, and to continue operation until the last light or appliance is turned off.

All controls for the Model 2100-BA are enclosed in two metal cabinets—one mounted on the unit and the other on the wall. To place the plant in service, the manufacturer explains, it is only necessary to connect the load wires to the proper terminals and to hook up

the starting battery. A high-rate or a low-rate charge is available for the batteries which are charged automatically while the plant operates.

Similar plants are available in a range of capacities from 700 to 6,000 watts, while other Universal electric plants of this type can be furnished for applications requiring capacities up to 25 kilowatts.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 1.

## Adds Wire-Rope Division

A wire-rope sales department has been formed at the Peoria, Ill., plant of R. G. LeTourneau, Inc. The company intends to inaugurate a full line of sizes, types, and construction of pre-formed and non-pre-formed wire rope under the trade name Tournarope.

Direction of the Tournarope sales will be handled by W. H. Wilson, Wire Rope Sales Manager, assisted by Alvin J. Becker, Sales Engineer.

## POWDER OPERATED CONSTRUCTION TOOL

**Drives Threaded Studs  
3 Inches Into  
Concrete Instantly!**



Thousands of DRIVE-IT Powder Power Tools are now in constant use from coast to coast.

### 3000 PERCENT FASTER

DRIVE-IT does in seconds what used to require hours. Eliminates drilling, hammering, compressors, electricity, cords, expansion bolts. Anchors anything to concrete, masonry or steel in a split second.

### HOW IT WORKS

DRIVE-IT derives its power up to 25 tons from a small powder charge encased in a standard .38 or .22 cal. cartridge. The desired anchor stud and cartridge are placed in the tool. The DRIVE-IT muzzle is forced vigorously against the work and at the same time the safety catch is released. This detonates the charge, and drives the stud with pile-driver force into steel or concrete. DRIVE-IT studs in ordinary concrete will hold the weight of the heaviest automobile.

### ABSOLUTELY SAFE

DRIVE-IT is the original power-operated tool. It functions without recoil shock... is as safe as an ordinary carpenter's hammer.

### UNLIMITED APPLICATION

Thousands of contractors, sub-contractors, and maintenance departments use DRIVE-IT tools to anchor wood sleepers to concrete; to "bolt" machinery; to hang metal lath, pipe, switch boxes, etc. See DRIVE-IT for yourself. Write for name and address of your nearest distributor, and full information.

## POWDER POWER TOOL CORPORATION

P. O. BOX 1610 (DEPT. E)  
PORTLAND 7, OREGON

## Selling Used Equipment?

Advertise it in the  
"TRADING POST"  
See page 123

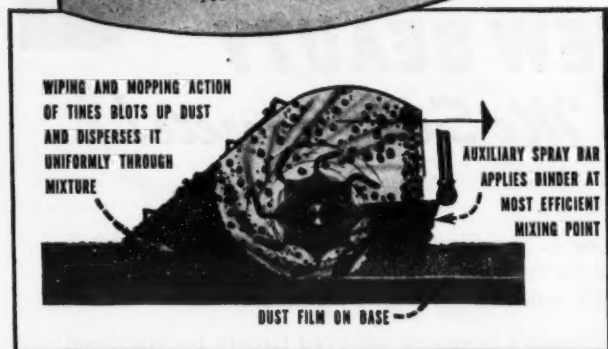
## Buying Used Equipment?

Read the  
"TRADING POST"  
See page 123

## WHY A SEAMAN-MIX IS A Superior mix...

### Analysis of the SEAMAN MIXER'S Action

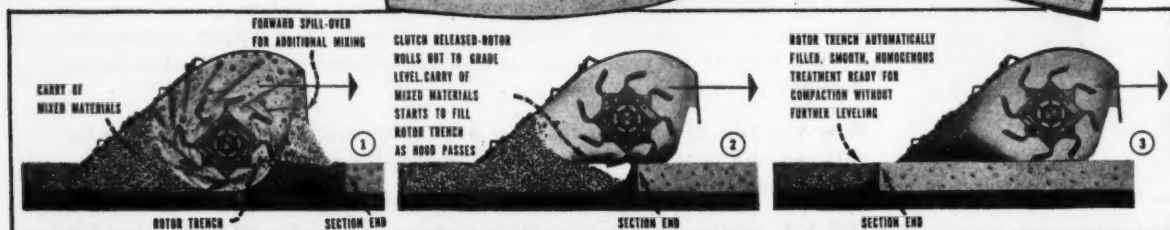
Sweeping, Mopping, Raking and Blotting—the SEAMAN Mixes-in Sub-base Dust film that Otherwise Prevents a Pavement Bond.



Raking, sweeping and mopping,—over 15,000 tine contacts per minute remove every particle of dust from the sub-grade and bring it into the mix. As rotor moves ahead, dust-film on sub-grade is completely removed and becomes a homogenous part of the thorough mix.

THERE'S an all-directional tornado of road materials created by the revolving tines within the mixing chamber. Tines are pitched and staggered to force a crossing movement to left and right as well as an upward throw. This action in itself achieves an excellent mix. Next, deflection from the scientifically curved hood throws a high percentage of the materials back into the rotor for further mixing action while another substantial portion is thrown ahead of the rotor in a heavy spill-over where it is again re-mixed as the rotor moves ahead. The tumbling and rolling action of the materials comprising the large "carry" of mixed materials within the hood's trailing edge adds further mixing, while the wiping action of the trailing edge itself intensifies the coating of the aggregate.

The "Carry" of Mixed Materials Smoothly Fills and Levels Each Section End.



Showing normal mixing position of materials and rotor as the SEAMAN approaches existing pavement marking end of a new construction section. Notice large "carry" of mixed materials held within trailing edge of hood.

Clutch is released at section end. Rotor rolls out of mix and up on pavement (or on ground surface). The "carry" of mixed materials is beginning to fill the rotor trench as the SEAMAN moves ahead.

Rotor trench is now completely filled with mixed materials, smoothed and leveled by trailing edge of hood. A feature of a SEAMAN-mix: it is ready for compaction after processing.

More Miles of Construction  
FOR YOUR ROAD BUILDING DOLLAR

SEAMAN MOTORS, INC.  
MILWAUKEE 3, WISCONSIN

# Cellular-Type Wall Built on Steel Piles

**New Section of Concrete Flood Wall 1½ Miles Long Is Built to Protect City In Mississippi Basin**

(Photo on page 1)

FROM the standpoint of river commerce, Cairo, Ill., is ideally situated at the junction of the Mississippi and Ohio Rivers. From the standpoint of floods, its location is potentially the most hazardous of any community in the Mississippi Basin—with the possible exception of Morgan City, La., near the mouth of the Atchafalaya River close to the Gulf of Mexico. Yet Cairo can boast of never having been flooded, even though its long wedge-shaped outline has been in more than one squeeze from the mighty rivers that rush past its doors.

That Cairo has kept its feet dry is due to the great system of flood protection which encircles it—a 20-mile chain of walls and levees enclosing 1,500 acres of the city of Cairo and an additional 6,000 acres in Alexander County. One of the sub-standard links in this chain was the wall section along the right bank of the Ohio River. But now that section is being made strong with the construction of a new 1½-mile-long concrete cellular-type flood wall supported on steel piles.

The improvement begins about ½ mile above the Cairo gage, which is at the foot of Fourth Street, near the junction of the Ohio and Mississippi Rivers, and continues upstream. Earth levees will flank the completed wall, their grade and cross section designed to withstand floods equal to or greater than those which have ever occurred at this point. The entire project is scheduled for completion in May, 1948, barring floods—otherwise the completion date will be advanced to the middle of July.

## Cellular Wall

The flood wall is a construction project of the U. S. Army Corps of Engineers, Memphis District. Ottinger Bros. Construction Co. of Oklahoma City, Okla., began work on it in February, 1947. The work was divided into two items of nearly equal lengths totaling 1½ miles, and the combined contract amount was \$1,230,000.

Actually three different types of work were included in the two contracts. About 50 per cent of the construction was new wall. About half the remainder consisted of building up an existing wall to the new grade. The rest of the work involved the construction of an outer wall in front of an existing wall so as to have the same cellular-type construction throughout the contract. In some places an old wall had to be removed.

The last great flood of record that struck the Cairo ramparts occurred in 1937 when the water rose to 59.5 feet on the Cairo gage. This was perilously close to the top of the old wall in the lower portion of this 1½-mile section, and was above the old wall in the upper portion. Double timber bulkheads 3 feet high, called "mudboxes," were placed on the wall and levee along the Ohio River. These bulkheads were reinforced by timber bracing and sandbags. Although the angry waters beat against the very top of this temporary protection and sand boils were fought within the city, a break-through was prevented.

Any future flood would have to climb to 64.6 feet on the Cairo gage to reach the top of the new work, which has an average elevation of 336.3. To reach

this grade the old wall, where it was retained, had to be raised 5.2 to 6.3 feet. Where the old wall was removed it still served a purpose, being used for riprap. Some of these structures date back prior to 1914. The average height of the new wall is 12 feet on the upper item and varies from 6 to 23 feet on the lower item. Because of space limitations an earth levee could not be built in this section. On the river side the Ohio is less than 100 feet away from the bank on which the wall is built. Directly behind the wall on the land side are two railroad tracks constructed on the earth embankment. Over these lines move the trains of the Big Four and the Illinois Central Railroads.

Thus the new wall had to be com-

(Continued on next page)

# TUTHILL

## GUARD RAILS

## SAFETY APPEARANCE VISIBILITY

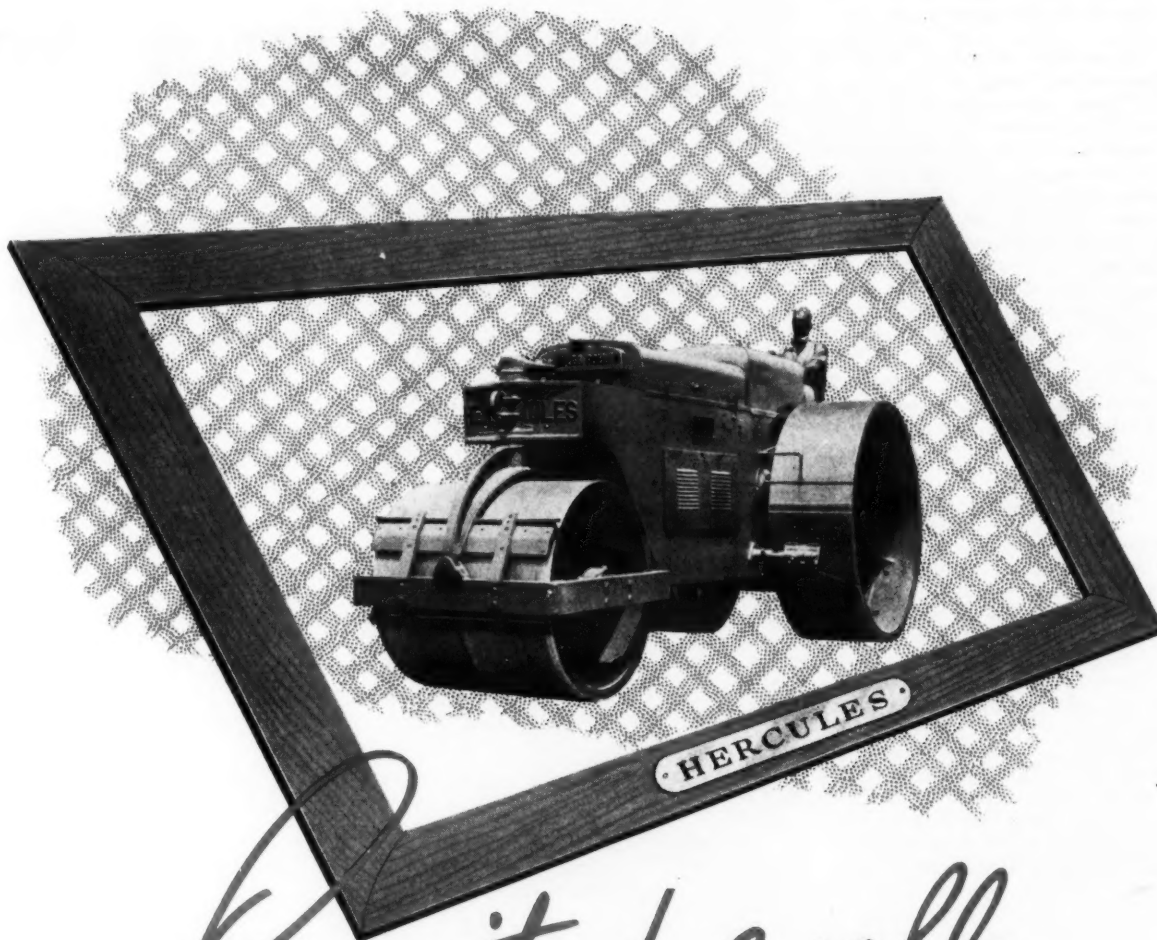
TUTHILL GUARD, with its convex surface and spring brackets, is safer, for two reasons. It can be seen quicker at longer distances. Its deflective action deflects cars back into highway and absorbs impact. Result—more lives saved—less damage to car and guard rail. Low upkeep cost.

Request Details

## TUTHILL SPRING CO.

762 W. POLK STREET, CHICAGO 7, ILLINOIS





*Portrait of a roller*

**THAT'S NEVER BEEN ON AN  
UNPROFITABLE JOB!**

This advertisement would never have been written but for a bit of good business logic on the part of a contractor. His name doesn't matter . . . the important thing is that he was regularly missing out on the profit end of his jobs. But fortunately, before it was too late, he learned the "good equipment" lesson. Now, he's top-gun . . . he's making a profit on the jobs he gets, because he's got good dependable equipment . . . HIS THREE-WHEEL ROAD ROLLER IS A HERCULES. In his own words . . . "I learned the hard way . . . profit on road construction jobs depends largely on the equipment used . . . and it's significant that my HERCULES three-wheel road roller has never been on an unprofitable job."

**HERCULES 3-WHEEL ROAD ROLLERS**  
Model HR-10 10 ton      Model HR-12 12 ton

**W. A. RIDDELL CORPORATION . . Bucyrus, Ohio**



C. &amp; E. M. Photo

A McKiernan-Terry 9B3 steam hammer, which is powered by a coal-burning locomotive-type boiler, drives Carnegie steel sheet piling at the north end of the Cairo flood wall. That's the Illinois Central RR bridge across the Ohio River in the background.

## Cellular-Type Wall Built on Steel Piles

(Continued from preceding page)

fact, yet sturdy enough to withstand the tremendous power of the Ohio in flood. These needs were met in the choice of the cellular-type wall. In the new section, which is mostly the upper half of the project, the dual walls are 16 inches thick and are 8 feet 8 inches on centers. They are connected by cross walls, 12 inches thick and from 10 to 13 feet on centers. Over the lower half of the job the cell walls are 12 inches thick, the same size as the old walls. The space between the walls is back-filled with dirt and sand which is tamped and compacted as it is placed. The material is brought up to a center height of about one foot above the level of the walls and shaped to a crown grade for drainage.

### Built on Steel Piles

Under the river-side wall a cut-off consisting of steel sheet piling, 30 to 50 feet long, was driven to prevent the river from undermining the structure. At the lower end, due to better ground conditions, the length of piling was reduced considerably. In some cases only 25 feet of steel was required. Interlocking piling with a width of 15½ inches was used. Underneath the land-side wall, 10-inch, 42-pound steel H-piles, 60 feet long, were driven on 7 to 10-foot centers for a foundation.

Both types of piles were furnished by the Carnegie-Illinois Steel Corp. and were shipped by rail from the South Chicago plant directly to the job site. They were unloaded by cranes from the tracks of the adjoining Illinois Central line, and placed in piles, spaced out as needed. While the constant rail traffic so close to the job was something no contractor would exactly relish, yet it was convenient for the delivery of materials. Reinforcing steel for the walls was also delivered the same way from the Laclede Steel Co. in St. Louis.

Most of the sheeting was driven by a McKiernan-Terry 9B3 steam hammer powered by an 87-hp coal-burning locomotive-type boiler. A Koehring 701 crane with a 110-foot boom usually handled the hammer. Some of the shorter sheeting was driven with a 3,000-pound drop hammer. In this case the piling was generally started by jetting through a 4-inch pipe; water was supplied from the river by a Jaeger 4-inch jet pump.

The H-beams were driven by a Vulcan No. 1 hammer in conjunction with the same boiler and crane, and steel leads 60 feet long. Driving was through an assorted mixture of cinders, clay, silt, sand, and gravel. Acetylene torches were used to cut both types of piles at a grade where they would project 12 inches into the bottom of the con-

crete walls.

A roundhouse and terminal of the Illinois Central RR are located at the south end of the contract; consequently, considerable switching of trains and engines was necessary on the track along the wall. To enable his equipment to maneuver without obstructing the tracks, the contractor filled in around the ties and rails, bringing them flush with the ground. In this way trucks, cranes, and other machinery could get around easily and the tracks were always kept clear of equipment.

### Batch Plant

Near the north end of the project where the space between the wall and the tracks is somewhat wider, the con-

crete batch plant was set up. This consisted of a 22-ton 3-compartment Erie AggreMeter, holding in one compartment fine sand, in another coarse sand, and broken stone in the third. On one side of the bin the two stockpiles of sand were built up; on the other side the stone was stored. The fine sand was trucked in 30 miles from a pit in Fayville, Ill. The coarse sand was the Ohio River variety, and was furnished by the Halliday Sand Co. of Cairo. The crushed stone came from the Federal Materials Co. at Cape Girardeau, Mo. Both the river sand and the stone came by rail to the batch plant, down the track paralleling the wall. They were unloaded by a Buckeye Clipper Model 70 crane equipped with a 35-foot boom and an Owen ¾-yard clamshell bucket.

The crane also kept the aggregate bin filled with material.

Air-entrained cement in cloth sacks was purchased from the Universal Atlas Cement Co. at Buffington, Ind., and was shipped in freight cars directly to the plant. If no walls were being poured, the bags were unloaded and stored in a 2,000-bag cement shed just north of the aggregate bin. When a pour was in progress, the batch trucks first backed under the aggregate bin to pick up the sand and stone, then passed the freight car where the cement sacks were tossed on top of the aggregate. When the contents were dumped into the paver skip, the bags were opened and emptied of cement. From two to four batch trucks, holding two batches each, were used to

(Continued on next page)

# Announcing INCREASED POWER

## INTERNATIONAL DIESEL CRAWLERS

Increased-horsepower engines now give these heavy-duty Diesel crawlers new power and performance values. Smoother, cooler operation and greater lugging ability step up their work capacity to a new high!

New illustrated folders, in color, describing these tractors are now available. Write to International Harvester for Form No. A-92-LL describing the TD-14 or if you want the facts on the International TD-18 ask for Form No. A-93-LL.

The 4-cylinder TD-14 now provides 57 drawbar horsepower at 1400 r.p.m.

The 6-cylinder TD-18 delivers 80½ drawbar horsepower at 1300 r.p.m.

Now is the time to see your International Industrial Power Distributor for your tractor, power unit and equipment needs. More and more, each year, you will find it good business to standardize on International.

Industrial Power Division

**INTERNATIONAL HARVESTER COMPANY**

180 North Michigan Avenue

Chicago 1, Illinois

CRAWLER TRACTORS  
POWER UNITS  
DIESEL ENGINES  
WHEEL TRACTORS

# INTERNATIONAL



haul the sand, stone, and cement to the paver.

Water for the mix, and also for the steam boiler used in pile driving, came from the city system. A line of hydrants running down an adjoining street was tapped with a reducer and 2-inch pipe from which a 2-inch hose ran to the paver.

Six-bag batches of concrete were mixed, with the weights of a typical batch as follows:

Cement	564 lbs.
Fine sand	105 lbs.
Coarse sand	1,156 lbs.
Stone	2,034 lbs.
Water	33 gals.

The gradation of the crushed stone and the combined types of sand was as indicated in the following tabulation.

Sieve Size	Per Cent Passing	
	Stone	Sand
1½-inch	90-100	....
¾-inch	40-70	....
¾-inch	10-25	....
No. 4	0-6	95-100
No. 8	....	80-90
No. 16	....	55-75
No. 30	....	30-60
No. 50	....	12-30
No. 100	....	3½-10

#### Wood Forms

Wood forms for the walls were solidly constructed of 2 x 8 tongue-and-groove stock in panels 18 feet long x 20 feet high, even though the full height of the panels was seldom required. The forms were backed with 3 x 6 studs on 24-inch centers. On the land side either double 2 x 4's or a single 4 x 4 was used for wales, while on the river side the wales were 4 x 6's. The average

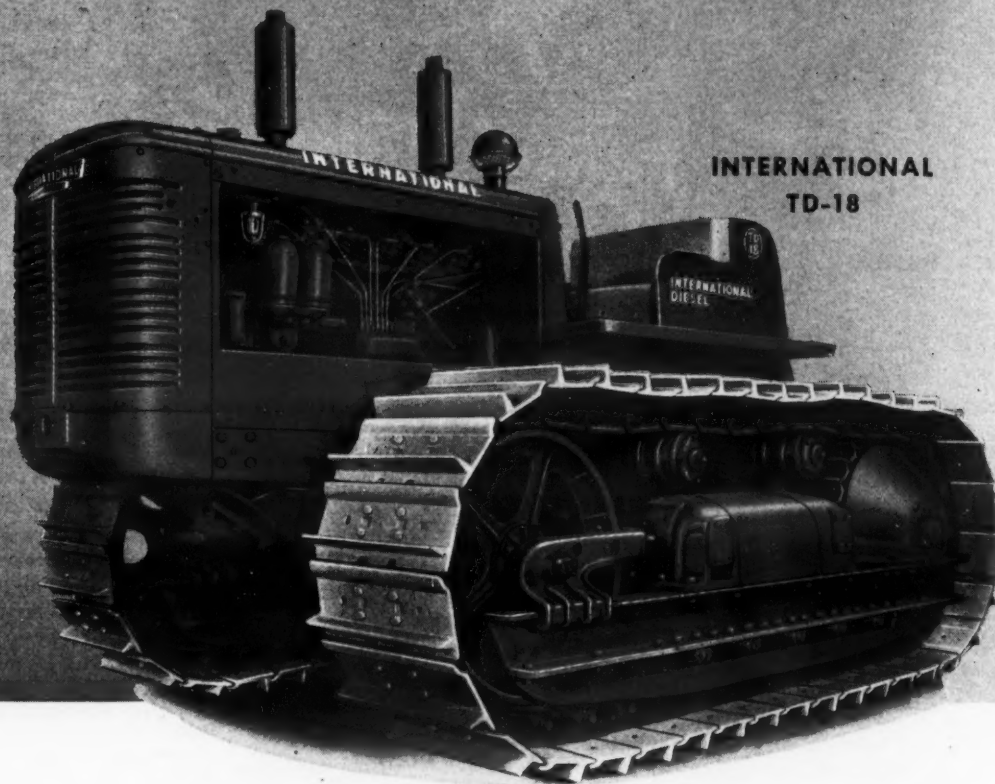
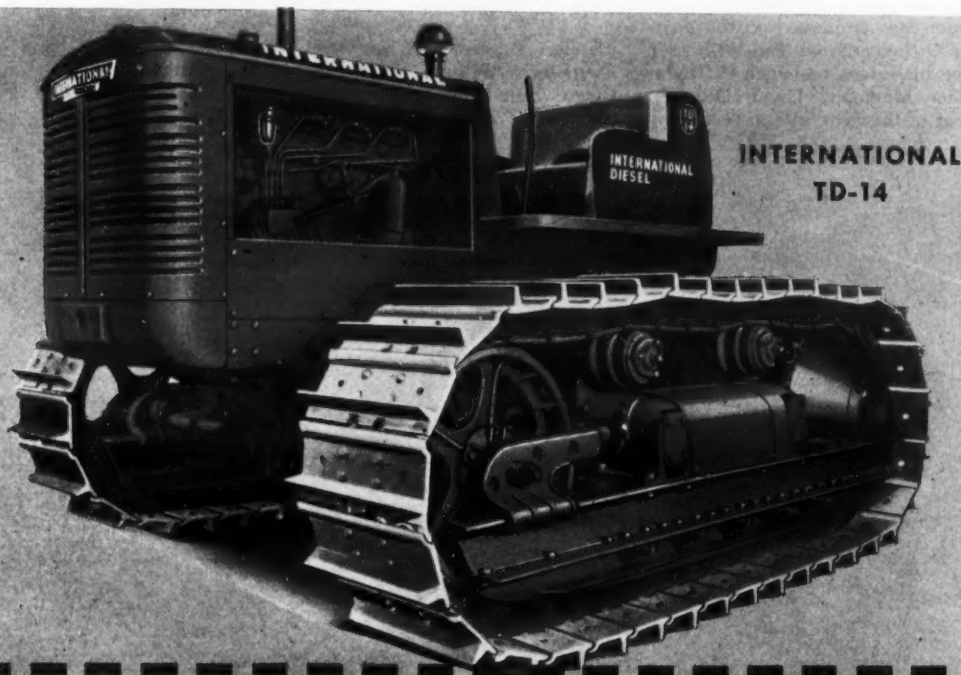
wale spacing was 4½ to 5 feet. Every 2 feet, both ways, the wall forms were tied together with Universal ½-inch tie rods. The space between the two cell walls was cross-braced with 2 x 6's every 4 feet, with other 2 x 6's nailed across the top at that same spacing.

Monoliths of 50 feet were poured at a time. This length was accommodated by using two 18-foot-long panels and one 16-foot panel, allowing a 1-foot lap at each end. The outside bracing of a section consisted of 4 x 4's or 3 x 6's secured to stakes in the ground every 6 to 8 feet. Most of the form work was of pine; three carloads of it came from Arkansas mills at the start of the job, and the remainder was supplied from local sources. Between monoliths a ¾-inch Serviced cork expansion joint

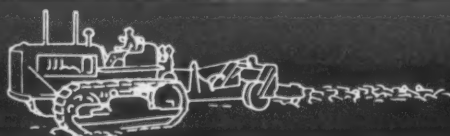


C. & E. M. Photo

A Buckeye Clipper 70 crane, using an Owen ¾-yard clamshell bucket, fills the stone compartment of the Erie Aggregate Meter which Ottinger Bros. set up at its batch plant.



# Industrial Power



was installed, together with a copper water stop to prevent seepage. Both inside and outside walls were poured at the same time in alternate monoliths, but the cross walls were poured later. The insides of the forms were sprayed with form oil before the start of a pour.

Where the existing wall sections were used, the overhanging coping of concrete was knocked off and the new lift was added by building the form flush with the sides of the old wall—except on two reaches where the new floor slab, placed on the existing wall, protruded to the river side in the form of a 5-inch coping. Holes were drilled 6 inches into the old concrete on 24-inch centers in order to fasten the form panels to it with cinch anchors and rods. Paving breakers were used to remove the concrete coping, or where the entire old wall had to come out. Eight breakers were on the job: 4 Ingersoll-Rands, 2 Worthingtons, and 2 Clevelanders. Power was supplied by a Jaeger 315-cfm and a Worthington 160-cfm air compressor.

Five openings had to be left in the walls to permit the flow of commerce and industry in and out of the city. Two of these lead out to river piers, one goes to a railroad siding, and the other two are for the tracks of the New York Central and the Illinois Central Railroads which enter the city after crossing the bridge over the Ohio River. In times of high water these openings are closed with stop logs.

#### Concrete Operations

Two 27-E pavers, a Koehring and a Rex, were used to mix the concrete. They worked on different monoliths, usually at opposite ends of the job. The booms were removed from both so that they could discharge directly from the mixing drum, after a mixing time of 1½ minutes, into Wiley 1-yard bottom-dump concrete buckets. The buckets were then picked up by cranes and lifted to the forms. Working with the Koehring paver was a Lorain L-41 crane with a 40-foot boom, while the Rex paver was teamed with a Koehring crane which had a 60-foot boom.

As much as possible, the contractor attempted to work from the river side of the wall in order to keep away from the tracks. This was possible to some extent at the south end of the job where the riverside berm was wide enough to accommodate the equipment. Upstream, however, the berm narrowed and finally all but disappeared, so that the upper half of the project had to be poured from the land side of the wall. When the river was high, all pours were made from the land side.

For the 50-foot monoliths each of the walls had six hoppers strung out over the top of the forms, and into these the concrete was dumped. From the bottom of the hoppers 5-foot sections of canvas tubing, 6 x 12-inch, extended down into the forms to prevent segre-

(Concluded on next page)



C. & E. M. Photo  
Concrete is emptied into wall forms from a Wiley 1-yard bucket swung from the 40-foot-boom of a Lorain L-41 crane. Notice the limited working space between the tracks and the wall.

## Cellular-Type Wall Built on Steel Piles

(Continued from preceding page)

gation of the concrete as it was placed. The usual routine was to dump a bucket of concrete into the hoppers along one wall, then to discharge the next bucketful into the other wall. As the concrete was placed it was vibrated with Mall and Jackson vibrators.

Because of the comparatively thin wall sections, heavily reinforced with steel, the concrete was placed at the rate of about 25 yards per hour with one paver. Both walls of an average-height monolith were usually completed in about 2 hours. But it took two days to erect the forms and set the steel for this pour. The forms were removed 48 hours after being filled with concrete, by another Koehring crane which used a 45-foot boom to handle the panels. The walls were then sprayed with Hunt Process curing compound.

### Earth Work

The contract also included building a short section of earth levee at the north end of the project; it goes under the railroad bridge to tie in to the existing levee. Also the walls had to be carefully backfilled, and the adjoining berms were graded. The material was spread in 6-inch lifts by an International TD-18 dozer which also pulled a sheepsfoot roller over the fill for compaction.

The fill between the walls consisted

of sand procured from the same source as was the coarse sand for the concrete—the Ohio River. Cranes clammed the sand into the walls from gondola cars which ran along the paralleling track. As it was placed the sand was soaked with water to consolidate and compact it within the walls. The top 2 feet of fill, however, was dirt, which was compacted by Ingersoll-Rand pneumatic tampers powered by compressors.

### Quantities and Personnel

The major items in the two contracts for the 1½ miles of cellular-type flood wall included:

Excavation	19,500 cu. yds.
Rolled fill	41,000 cu. yds.
Riprap	5,300 cu. yds.
Steel sheet piling	158,600 sq. ft.
Concrete	12,425 cu. yds.
Steel reinforcement	1,730,000 lbs.
Steel bearing piles	26,500 lin. ft.

During the peak of operations a force of 160 men was employed on the project. For Ottinger Bros., Ted Wilkerson was Superintendent, and Jack H. Taylor was Office Manager. Clyde Ottinger, a member of the firm, also gave the job



C. & E. M. Photo  
Left to right are Clyde Ottinger, partner of Ottinger Bros. Construction Co.; Mrs. Clyde Ottinger; Ted Wilkerson, Superintendent on the Cairo flood-wall job; and Jack H. Taylor, Office Manager.

his close supervision. For the Corps of Engineers, William A. Steele of the Cairo Sub-Office was Engineer in Charge, assisted by Clyde M. Hogue.

The project was directed from the Memphis District which is now headed by Colonel L. H. Foote, District Engineer.



**Team up** two Oliver "Cletrac" crawler tractors with a bulldozer and front-end loader and you've got a winning combination that really pays off in fast, low-cost dirt moving.

With the exclusive Oliver "Cletrac" steering principle, the tractor-dozor unit cuts your clearing time to the minimum. There's always power on both tracks for biggest load-handling ability. You can speed up one track, slow down the other to offset the side pull of an off-center load. Time-wasting, power-wasting jackknifing is eliminated. And with constant two-track power,

operation on hills and slopes is safer.

Oliver "Cletrac" steering lightens the load of front-end loaders, too. There is no undue strain of tractor frames or steering mechanisms. This Oliver "Cletrac" loader is a fast-acting unit that really makes dirt fly! Controlled "tip-up" bucket prevents spillage of loose material. And, since there's no excess weight on the front of the tractor, lifting capacity is materially increased.

Why not have your Oliver "Cletrac" dealer show you how this hard-working "team" can speed your jobs?

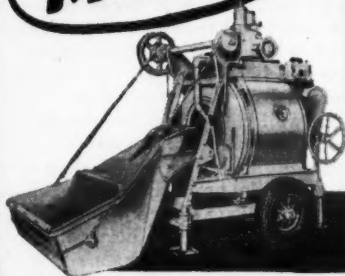
## Cletrac

a product of

## The OLIVER Corporation

INDUSTRIAL DIVISION: 19300 EUCLID AVENUE, CLEVELAND 17, OHIO

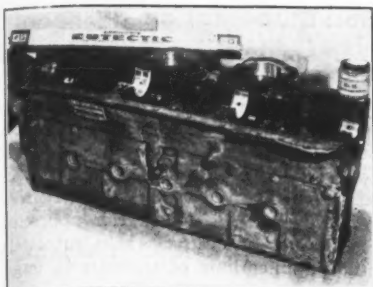
"THE SIGN OF  
EXTRA SERVICE"



ONE, TWO AND THREE BAG SIZES.

Fast, compact, efficient—Built with Timken bearings, Machined drum tracks—Silent transmission and other plus value features. See the CMC Distributor today—or write for catalog.

CONSTRUCTION MACHINERY CO'S.  
WATERLOO, IOWA



This worn truck-engine block was recently built up by welding with EutecRod 15 and Eutector Flux 15 at a materials and labor cost of \$8.52.

### Engine-Block Seat Built Up by Welding

The seat of a truck-engine block was recently built up by welding so that there was no need to replace the entire block. The main bearings were so worn that the inserts turned in their seats—indicating that the casting itself was worn. The casting or block seat to take the insert was built up using EutecRod 15 with a companion flux, Eutector Flux 15. These are made by the Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y.

According to Eutectic, this rebuilding process presented no problem for the welder as far as distortion from high heat was concerned, because of the low bonding temperature of the EutecRod 15—354 degrees F. This rod is specially designed to fill cracks and seal leaks on castings, and to form a base for babbit metal on cast-iron and bronze bearings.

In reporting this job, the manufacturer points out that a total of \$2.52 cents worth of rods was used, and that the cost of labor was \$6.00. This is well below a total of \$10.00, whereas a new block would have cost in the neighborhood of \$100.00.

### Maintenance Equipment For Roads and Airports

Literature on its various types of road and airport construction and maintenance equipment has been made available by the Spears-Wells Machinery Co., Inc., 1832 W. 9th St., Oakland 7, Calif. This machinery includes road-oil distributors, chip spreaders, traction brooms, and the Spearwell Heater Planer designed for processing of bituminous surfaces.

The Spearwell road-oil distributor is made in sizes with a capacity of from 600 to 4,000 gallons. Spread widths vary up to 12 feet. The folder lists the equipment which is standard on all Spearwell oilers, and illustrations show eighteen typical views and applications of the oiler.

The description of the Spearwell spreader stresses the spread adjustment. This can be controlled as to width and volume as well as to location—right, center, or left of the rear center line of the truck carrying it. The Spearwell traction broom is of the 3-speed reversing type, and this unit is discussed in detail. The folder shows pictures of it being used on right and left sweeps, and also lists its complete specifications.

The other piece of equipment which this folder covers is the Spearwell Heater Planer. This unit is designed as an aid in the reconditioning of bituminous concrete and oil streets and highways. It is available for sale, contract use, or rental, and the folder points out that Spears-Wells engineers are available for consultation and service.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 42.

### Simplex Executive Dies

Arthur Crane Lewis, former Vice President in Charge of Sales for Templeton, Kenly & Co., died recently at Toronto, Ont. He had been with the Simplex Jacks Division since 1944.

### Spray Unit Spreads Oil on Metal Forms

A lightweight hand-spraying unit adapted for use in the highway and heavy-construction industry is made by the Lowell Mfg. Co., 589 E. Illinois St., Chicago 11, Ill. It can be used for spraying oil on metal forms, concrete-curing compound on small areas, and similar applications. It is listed as the Model No. 26-G Lowell Junior.

The unit has a 2½-gallon capacity, and is tested to withstand pressures of 100 pounds. The tank is 7¼ inches in diameter, 16 inches high, and is made of galvanized or copper sheets, depending on the materials which will be used in it. The pump is 1¾ inches in diameter, 14

inches long, and is designed to lock securely to the top of the tank. The unit is supplied with 2 feet of ¾-inch high-pressure spray hose. The all-brass shut-off valve can be locked for continuous spraying. The web carrying strap is attached by means of snap connectors.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 46.

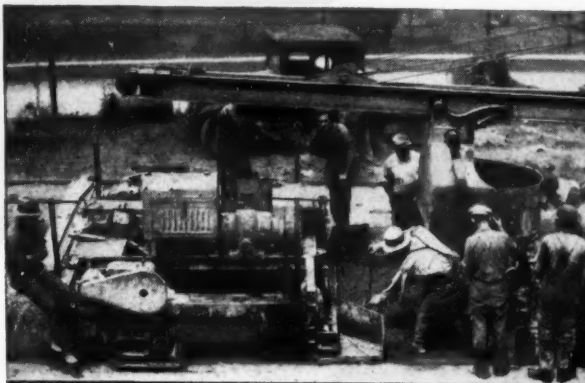
### Designs and Applications Listed for Line of Pumps

A catalog on the Rex Easy Flow Speed Prime pumps is available from the Chain Belt Co., 1666 W. Bruce St., Milwaukee 4, Wis. It describes the main

design features through the use of photographs and cutaway drawings. It also contains detailed specifications on the Easy Flow pumps, and shows many pictures of them in use on various jobs.

Design and application information is covered in detail, as well as information on how to determine which pump is the right one for a specific job. Engineering data included in Bulletin No. 47-12 cover water friction in 100 feet of pipe; practical suction lifts at various altitudes; water friction in 90-degree elbows; and pressure conversions. These are given by means of tables, charts, and formulae.

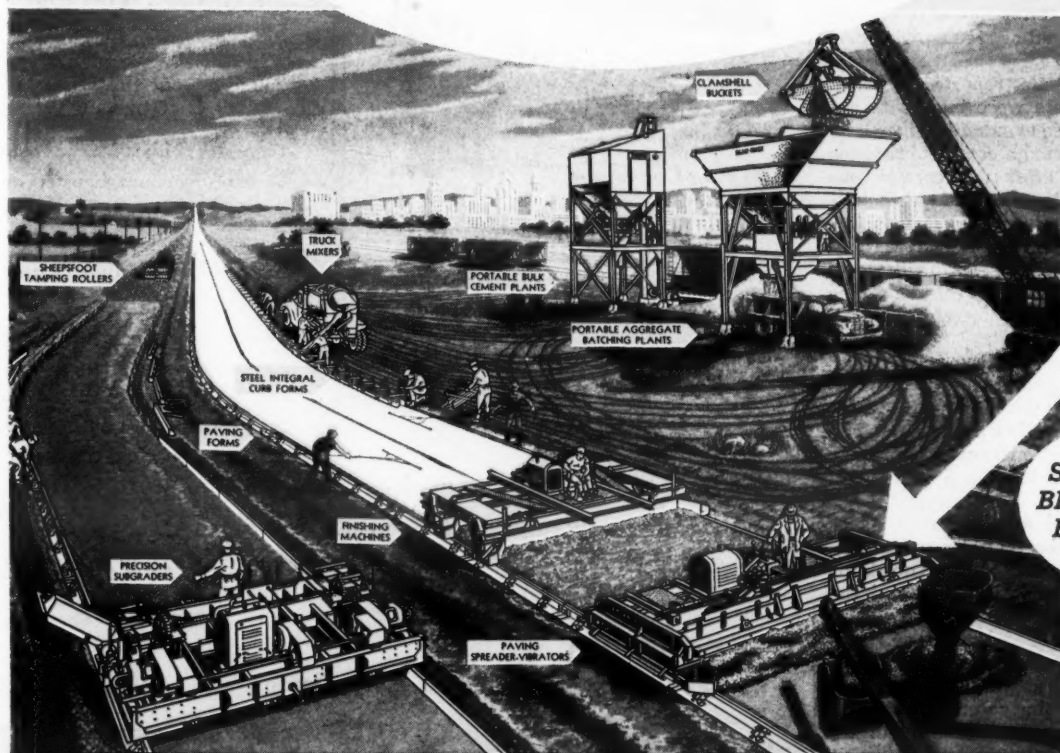
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 70.



## REMEMBER WHEN ?

...remember when  
the FINISHER had to wait  
for the pit men?

## Now - a MECHANIZED BLAW-KNOX CONCRETE SPREADER does that job QUICKER...BETTER...AT LOWER COST WITH ONE OPERATOR



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before and after  
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for a complete outfit of job-tested  
concrete paving machinery is...

# BLAW-KNOX



C. &amp; E. M. Photo

Here is how accidents occur. This man was trying to grease the gears of a paver in motion. He was lucky. The gears just grabbed the snout of the grease gun and ruined it. The cost of damaged equipment and the danger of accident can be avoided if greasing is done only when equipment is idle.

## AGC, AASHTO Plan Greater Cooperation

Steps taken to establish closer relations between highway officials and highway contractors were reported to the Joint Cooperative Committee of the American Association of State Highway Officials and The Associated General Contractors of America, Inc., at the 29th Annual Convention of the AGC in Dallas, Texas, in February. In several states, joint committees are being formed by highway officials and AGC highway contractors. These state-level groups are patterned after the national Joint Cooperative Committee. Notable progress in revising specifications and bringing them up to date has been observed in several states through these efforts.

In discussing the state joint committees, D. W. Winkelman, 1948 President of the AGC, said that the progress reported was very encouraging, and that such local committees constitute "the greatest shortcut" to solving problems common to engineers and contractors.

Colorado reported that specifications were revised for fourteen units by the joint efforts of the Highway Department and a committee from the Colorado Contractors' Association, Inc., of the AGC. These were submitted to the Public Roads Administration, which made a few changes. The two particular points kept in mind in revising the Colorado specifications, according to the contractors, were: (1) elimination, wherever found in the specifications, of the phrase "as directed by the engineer", and (2) elimination of references to methods instead of results, wherever possible.

Changes were also reported in Texas, where contractors were invited to appoint a committee to submit suggestions. New York reported a complete revision of specifications after two years of conferences with interested groups, including highway contractors. It was announced that a new set of specifications would be ready soon for the State of Washington. The merit of compiling uniform specifications for states in regions with similar climatic and other conditions was discussed.

Other points brought up at the 29th Annual Convention of the AGC were: enforcing specification changes, standardizing specifications, and encouraging young men to enter the field of civil engineering.

It was pointed out that contractors and engineers share the responsibility to inform the public of the need for highway funds, their sources, and the uses to which they are put. Also stressed was the need for action on decisions reached at meetings of the joint committees. One engineer presented an example of how he got results in the enforcement of specification changes; he said he found it necessary to visit each field office and go over items recommended for elimination.

It was agreed that there is a great need for the states to give attention to standardizing as many items as will obtain good results with greater economy. Among the items mentioned were curb-

The resolution on encouraging civil-engineering students was prompted by reports that retirements are rapid, not enough young men are entering the profession, and that the field must be made more attractive to provide adequate highway engineering personnel for the highway programs under way and in prospect.

A. C. Clark, Chief of the Division of Construction, Public Roads Administration, reported that a PRA memorandum is being prepared to the effect that a weekly payroll report by contractors doing Federal construction will no longer be required. However, an affidavit will continue to be required each week, together with a simple report of three items: (1) total number of names on the payroll, (2) total hours worked, and (3) total amount paid. A breakdown showing the classifications for one week, on Form P. R. 200, will be required once every three months. The agency is taking this action as the result of an announcement by the Department of Labor that it will no longer require

copies of the weekly payroll from contractors doing Federal work. Contractors are required, however, to preserve their records for three years after completion of a contract.

## One-Cylinder Engine

A lightweight 5-hp engine is available from the Graham-Paige Motors Corp., York, Pa. It is recommended by the manufacturer for use with pumps, generators, mixers, compressors, saws, and similar applications requiring an engine of this size and capacity. Standard equipment includes an air cleaner, spark plug, starter assembly, magneto, throttle, choke, and stop switch.

This single-cylinder 2-cycle engine has a 3 x 3 1/4-inch bore and stroke, a piston displacement of 22.97 cubic inches, a fuel-tank capacity of 9 quarts, and a self-winding cable starter. It weighs 200 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 98.

## Soil-Stabilization System Described in New Manual

A 23-page manual which describes its system for soil stabilization can now be obtained from Seaman Motors, Inc., 305 No. 25th St., Milwaukee 3, Wis. It covers mixing for bituminous construction as well as soil-stabilization processes. It also describes the operating techniques for the Seaman mixer in other applications of interest to engineers and contractors.

Bulletin S-100 contains more than forty action photographs. The text is designed to present concise, time-saving explanations. Among the subjects treated are brush and root removal in land-clearing work, methods of obtaining higher densities in earth fills, preparation of grass seed beds for road shoulders, backstops and landscaped areas, and the use of the Seaman mixer in clearing ice from streets and highways.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 65.

# Buckeye

## The Outstanding 3/4 Yard Shovel

Now Better Than Ever\*

Available for spring shipment

### \* CHECK THESE NEW FEATURES

- 2-piece swing clutch band-velvet smooth operation; easier replacement.
- Heavier revolving frame; more massive conical roller assembly; hardened steel roller path.
- Positive locking device on crawler adjusting bolt.
- Relay valve in dipper trip vacuum chamber speeds dumping.
- 3-cyl. GM 3-71 diesel engine with hydraulic coupling furnishes greater, smoother, more economical power (optional) and others.

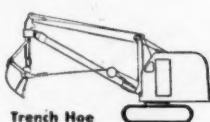
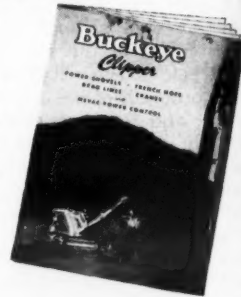
and others

Always a "best buy" because it offers *all* of the construction and operating features that most shovel users want—*plus* Mevac (metered vacuum) power control, the Buckeye Clipper is now better than ever. Buckeye engineers and field men constantly sounding out the hundreds of owners have incorporated feature after feature to make it truly "the users shovel".

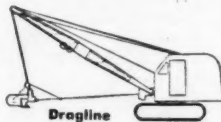
Operators like Mevac control—light touch on small levers actuates vacuum boosters which operate shovel—easy on the operator, easy on the shovel. Faster action, greater yardage. Cuts maintenance costs too. Nothing to freeze, heat-up or leak. Only Buckeye Clippers have Mevac control.

Send for a copy of the new Buckeye Clipper book—pictures Buckeye on all types of excavating, loading and handling jobs—takes the shovel apart before your eyes—explains Mevac control.

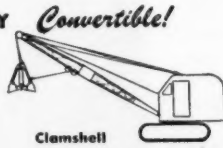
See You At the Road Show



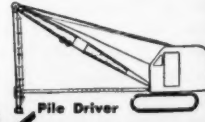
Trench Hoe



Dragline



Clamshell



Pile Driver

FULLY Convertible!

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Findlay Division  
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Other Products: Buckeye Ditchers, Spreaders, Finegraders—Gar Wood Scrapers, Dozercasters, Tipdozers  
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# Buckeye

GAR WOOD  
INDUSTRIES

## Pre-Season Equipment Servicing Cuts Costs

**An Effective Maintenance Program Is One Which Is Undertaken Early: It Will Provide a Good Insurance Against High Operating Costs Later**

AS the new construction season is about to go into full swing, a little reminder about pre-season maintenance is especially apropos. For to get the most out of your equipment, it is important that it be in peak operating condition. Accordingly, the following pointers on proper equipment overhaul have been prepared by the Service Department of the Allis-Chalmers Mfg. Co., Milwaukee, Wis. They are designed to provide a good guide for a pre-season equipment check-up.

### Air Cleaners

The length of satisfactory performance obtained from the pistons, rings, and cylinders of any engine is mostly dependent upon the care given the air cleaners. Remember that all dust is abrasive, and if it enters the engine it may mean that you will have to pay engine overhaul costs. Here's how to prevent that from happening.

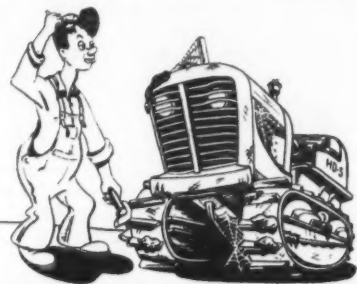
1. Service the pre-cleaners if the engine is equipped with them, being sure to follow the manufacturer's instructions. The pre-cleaners must be tight on the stack as they take a heavy load off the air cleaners.

2. Remove the oil-bath air cleaner and clean it thoroughly, swabbing the inlet tube and servicing the oil cup according to the manufacturer's instructions. If the cleaner has removable mats, remove and wash them in kerosene or cleaning fluid. After cleaning, allow them to drain. Saturate again with oil and replace.

3. Clean the passageway to the engine and cement all gaskets and hose connections. Be sure hose and hose clamps are in good condition and, most important, be sure all connections are tight.

### Battery

To keep your battery in good operating condition, keep the outside of it clean and dry, and keep the terminals free from corrosion. Add distilled water to the battery regularly. The level of



This chap isn't as dull as he looks, for he's getting ready to overhaul his equipment BEFORE the construction season begins.

the solution should be  $\frac{3}{8}$  of an inch above the separators. Water should be added to the battery just before using the machine so that the charging received from the generator will mix the water with the electrolyte.

### Brakes

You will want to be certain you can depend on your brakes. Check thoroughly both the steering and service

brakes and, if necessary, reline the bands. Inspect the control mechanism and linkage, freeing any stiff or frozen yokes, pins, or shafts that you find. Replace any badly worn parts. Lubricate all linkages and adjust the brakes.

### Cooling System

An efficient engine depends upon an efficient cooling system. Check the cooling system for leaks, and make any necessary repairs to radiator, water pump, hoses, and connections. Inspect the thermostat. Then clean and flush the entire system, not forgetting to clean obstructions and foreign material from the outside of the radiator core. The fan should be checked for loose blades and bearings. The belt should be adjusted and a new one installed if it is needed. Any missing baffles or shrouds should be replaced.

### Engine Clutch

To keep your clutch operating smoothly and dependably, you must give it proper maintenance. Inspect the

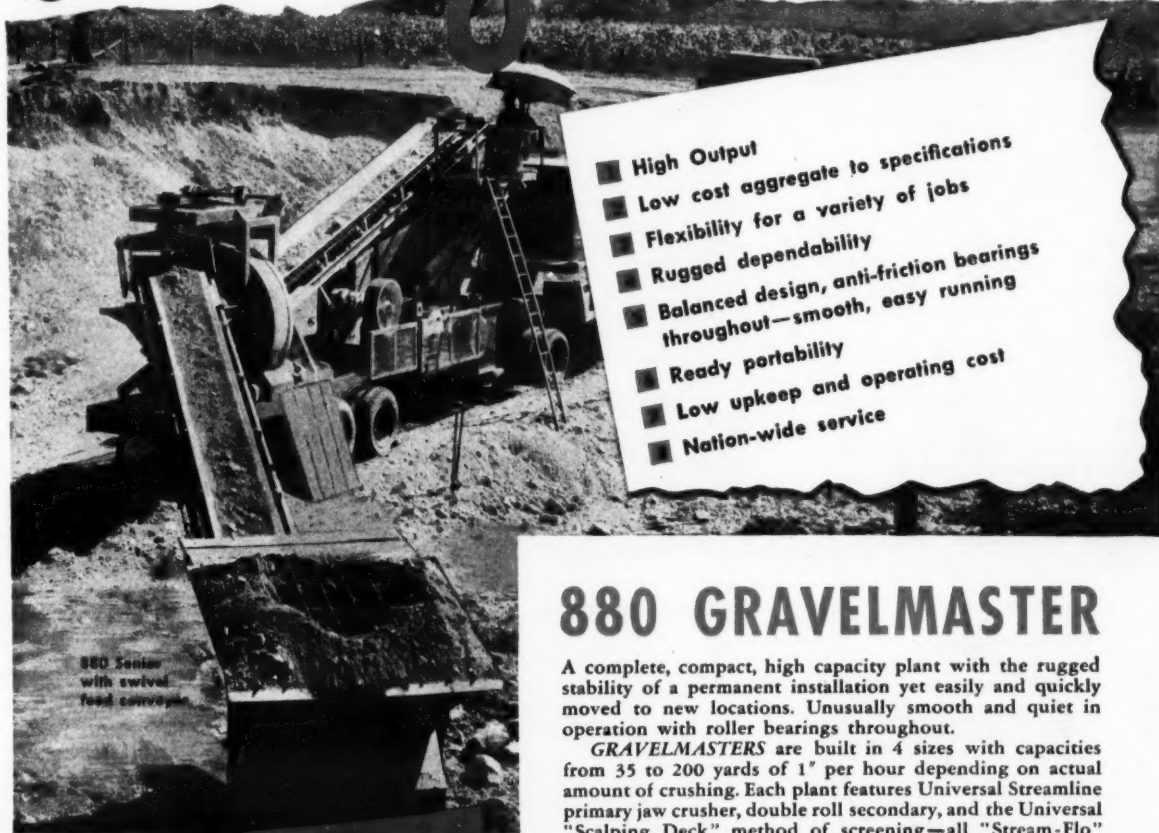


Engine, battery, brakes, cooling system, tracks—all deserve a thorough pre-season check-up.

control linkage, and if you find any stiff or frozen yokes, pins, or shafts, free them. Check release bearing for wear. If the amount of possible adjustment indicates that the clutch is nearly worn out, replace the driven plate or facing and other worn or broken parts. Then, adjust the clutch to the proper

(Concluded on next page)

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- High Output
- Low cost aggregate to specifications
- Flexibility for a variety of jobs
- Rugged dependability
- Balanced design, anti-friction bearings throughout—smooth, easy running
- Ready portability
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- Nation-wide service

## 880 GRAVELMASTER

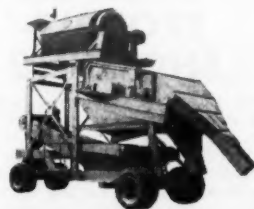
A complete, compact, high capacity plant with the rugged stability of a permanent installation yet easily and quickly moved to new locations. Unusually smooth and quiet in operation with roller bearings throughout.

GRAVELMASTERS are built in 4 sizes with capacities from 35 to 200 yards of 1" per hour depending on actual amount of crushing. Each plant features Universal Streamline primary jaw crusher, double roll secondary, and the Universal "Scalping Deck" method of screening—all "Stream-Flo" engineered to assure high capacity with low operating and maintenance costs. Highly flexible, Universal GRAVELMASTERS are used as complete gravel crushing, screening, and loading plants or to step up production as secondaries following a primary in either pit or quarry operations.

WRITE FOR BULLETIN No. 39AB

### PORTABLE WASHING PLANT

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## FOR PRODUCTION AT A COST THAT LEAVES MORE PROFIT

Universal "Stream-Flo" Engineering provides the perfect balance of high capacity units to assure steady flow of properly graded material. No starving, no glugging . . . results in more yards per hour at less cost per yard.

Let Universal Engineers recommend the equipment best suited to your crushing, screening, washing, and loading requirements.

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50 years of manufactur-  
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for you a special steel,  
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wearing quality you need.

All widths lengths,  
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Consult your International  
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## Pre-Season Equipment Servicing Cuts Costs

(Continued from preceding page)

amount of free travel or lever pull according to the manufacturer's recommendations.

### Engine

Start and run the engine long enough to get the oil warm. Then check the oil pressure, valve adjustment, injector, spark plugs, compression and high and low idle speeds. Keep an eye open for oil leaks at gaskets and seals. Remove all carbon. Recondition the valves and seats. Overhaul the injector and fuel system, carburetor, ignition, and electrical system, if needed. If oil pressure and compression are low, an engine overhaul is probably necessary.

Remove and clean the crankcase breathers, for if the cap is allowed to become clogged with dust, crankcase ventilation will be shut off. This will increase condensation in the crankcase and cause excessive crankcase pressure. Most breather caps contain a filtering mat that must be kept moist with crankcase oil. Remove and wash the cap in kerosene or cleaning fluid. After the cleaning fluid has drained off, dip the cap in crankcase oil. Shake off the excess oil and re-install.

### Steering Clutches

The first thing to do on the steering clutches is to inspect them for the amount of adjustment remaining. If all adjustment is used up, overhaul the steering clutches. Next, check condition of release bearings. Then if clutches are greasy, wash them using a non-inflammable cleaning fluid. This requires a 4-step procedure.

1. First, install plugs in the drain holes of the steering-clutch compartment. Pour about 3 gallons of cleaning fluid into each compartment.

2. Run the tractor back and forth for several minutes without releasing the steering clutches. Then drain each compartment.

3. Once again replace plugs and pour 3 gallons of cleaning fluid into each compartment. Operate the tractor without load for about 5 minutes, releasing both clutches as often as possible. Then drain the compartments.

4. The release bearings must be lubricated immediately after the steering clutches are washed, as all lubri-



With his tractor ready to go as soon as the eaves start dripping from the north side of the shop, this fellow will cut his operating costs and repair bills later on.

cant will have been washed from them. Operate with a light load until clutches are thoroughly dry to prevent excessive slippage due to the presence of solvent on disks.

### Tracks, Trucks, Wheels

If the track pin and bushing are con-

siderably worn but not cracked, turn them. At the same time, change the sprockets from one side of the tractor to the other. If the bushings are worn out or cracked and the pins badly worn, install new ones. It is a good idea to install new sprockets if new track pins and bushings have been installed. Otherwise the track may be out of pitch with the worn sprocket. Remember to tighten the track-shoe bolts and adjust the tracks.

Truck wheels, track idlers, and support rollers should be inspected for worn flanges, end play, and up and down motion. Overhaul or replace if necessary. Tighten mounting bolts and lubricate according to the manufacturer's recommendations.

### Gears

A thorough inspection should be made for worn, loose, or broken gears and bearings. Make any replacements that are necessary. Drain the oil and refill with the proper grade. If drainings contain metal chips or particles,

look for the source. If there is any leakage, check all seals and gaskets, replacing necessary parts to prevent further leakage.

### General

Install new lube-oil and fuel-oil filter elements. Inspect the machine for loose, broken, or missing parts. Replace all damaged or missing grease fittings and be sure the grease tubes are connected and in good condition.

This preventive maintenance is your best insurance against high repair bills and high operating costs.

### To Make Flexible Tubing

Formation of the Flexible Tubing Corp. has been announced by the company officials. Laboratory, design engineering, and manufacturing facilities for the company will be located in Branford, Conn.

The company will make flexible tubing in a wide range of sizes and types of construction.



Steady 90-100 lbs. pressure, in up to 70% larger air receivers, means full production from air tools.



2 heavy duty wagon drills, under the full pressure of 600 cu. ft. of air per minute from a Jaeger Model 600, drill 20% to 30% more daily footage than you can get with 500 ft. of air. Companies that watch their costs are using Jaeger "AIR PLUS" Compressors in all sizes from 60 to 600 cfm—for faster production, for the economy of Jaeger's "Fuel Miser" speed control, for the simple, rugged Jaeger design that requires less attention on the job and minimum expense of upkeep.

On thousands of jobs, contractors are finding that they get faster production with a Jaeger "AIR PLUS" than with other compressors of the same rated capacity.

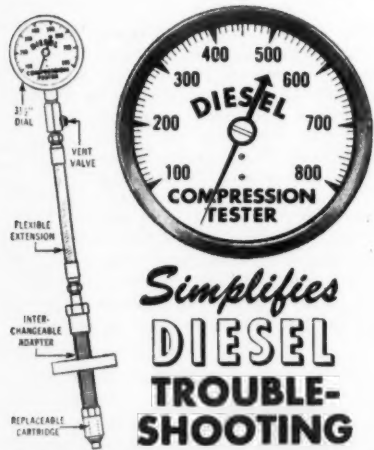
That's because Jaeger engineers designed to give you steadier air pressure, with a high efficiency compressor and fuel tank recessed to make room for a much larger air receiver.

Steady full pressure means top-speed operation of your drills—faster, full-powered blows with pavement breakers, spades and tampers—more production per tool and handler every hour they work.

Jaeger insures you against "down time", too. "AIR PLUS" Compressors are built to the same precision as their engines. Their parts, power plants and performance are individually tested in a \$250,000 laboratory. And leading distributors in 130 cities provide efficient on-the-spot service wherever your jobs may be.

THE JAEGER MACHINE COMPANY, Columbus 16, Ohio

REGIONAL OFFICES: 1504 Widener Bldg. PHILADELPHIA 7 226 N. La Salle St. CHICAGO 1 235 American Life Bldg. BIRMINGHAM 1



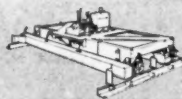
**Simplifies  
DIESEL  
TROUBLE-  
SHOOTING**

No single factor of Diesel operation is more important than compression pressure. That's why trouble-shooting begins with a check of compression of all cylinders. Model YUF Diesel Compression Tester illustrated has been designed to meet all field and shop needs for an instrument that can take hard use yet give reliable, accurate readings on any make of Diesel engine.

Attachment of tester is by means of interchangeable adapter which takes place of fuel injector. In addition to a "universal adapter" which serves more than 50 makes and types of Diesels, we have a complete line of special adapters for practically every commonly-used Diesel engine. Write for a copy of descriptive Leaflet 605.

ATTENTION! Distributors: Diesel equipment and accessory jobbers are invited to write for information about attractive distribution propositions.

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"SURE PRIME"  
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**JAEGER**  
*Engineered* EQUIPMENT  
"DUAL-MIX" TRUCK MIXERS, AGITATORS — HOISTING  
ENGINES, SELF-RAISING TOWERS — CONCRETE AND  
BITUMINOUS PAVING EQUIPMENT

## Equipment Distributor Doings

### Message to Dealers At Seaman Open House

About fifty dealers for Seaman Motors, Inc., gathered in Milwaukee on February 19-20 for the annual company open house. An interesting program of talks and plant inspection was presented.

Among the messages to the group was one by Donald V. Buttenheim, General Manager, CONTRACTORS AND ENGINEERS MONTHLY. Mr. Buttenheim called his talk "Eight Jumps Ahead of the Eight Ball" and made the following suggestions for dealers, if they are to find their businesses flourishing 5 or 10 years hence.

1. Get out on construction jobs to see for yourselves what's going on. Your mission out there is first to learn—to see how the equipment you sell is being used. Second, it's to teach—to teach efficient equipment use. For the most important single element of a profitable job is having a superintendent or foreman who knows how to use his equipment right. There's a big job ahead for manufacturers, dealers, contractors, and trade papers in getting additional knowledge of efficient equipment use implanted at the superintendent, foreman, and even individual-operator level. The dealer who can make progress in that one direction alone will never have to worry about staying in business.

2. Get to manufacturer headquarters occasionally, to know the personnel there better and to learn from factory experts.

3. Work towards the kind of showroom and shop which will favorably impress customers and manufacturers. Ultra-modern architecture is not half as much in your favor as a business-like and busy office, a courteous receptionist, and attentive anxious-to-help salesman on the floor, and a well systematized shop and repair parts set-up.

4. Try to develop something unique in service for your customers and prospects—something that sets you apart completely from your competitors.

5. Read your trade publications regularly, for news on new equipment and interesting or new field applications of the equipment you handle.

6. Take full advantage of the ARBA Road Show in Chicago in July. And see that the younger men who are coming along in your organization get there too.

7. Take what part you can in AED, ARBA, and other association activities for the overall advancement of the construction industry.

8. Inspire yourselves and your associates through a new look at the concept of selling and what it means to be not just a salesman but a professional

salesman. Robert S. Wilson, Sales Vice President of Goodyear, has said: "The customer's regard for the salesman depends on: what kind of man the salesman is; the salesman's regard for the company; and the company's regard for the salesman."

"At one extreme of the spectrum is

the messenger-boy type of salesman who runs errands between the customer and the company. The other extreme is the professional salesman who literally is the company so far as his customers are concerned."

Mr. Buttenheim concluded: "If any distributor makes headway along these

lines, he is on his way towards building a business that will stand firm, come prosperity, recession, or depression. He won't even have to worry, like so many these days, as to just which we are currently enjoying. The best distinction I ever heard was that if you have a

(Continued on next page)



# NEW CHEVROLET ADVANCE-DESIGN '48 TRUCKS ARE LOWEST IN PRICE!

and have *all* these new and finer features

Here are the *newest* trucks—the *latest* and the *greatest* features—the *biggest* values—with the *lowest* prices in the volume field! Model for model, and with comparable equipment and specifications, Chevrolet Trucks *list* for less than competitive makes—some models *as much as \$150!* Here is Advance-Design that provides the cab that "breathes,"\* Flexi-Mounted Cab, Uniweld all-steel cab construction, fully adjustable seat, all-round visibility with rear-corner windows,\* extra-durable frames, specially designed brakes, and many other features that put Chevrolet trucks far ahead of the field. See them at your Chevrolet dealer's.

CHEVROLET MOTOR DIVISION, GENERAL MOTORS CORPORATION  
DETROIT 2, MICHIGAN

\*Fresh air heating and ventilating system and rear corner windows optional at extra cost.

### NEW CHEVROLET 4-SPEED SYNCHRO-MESH TRUCK TRANSMISSION



This Chevrolet-developed Synchro-Mesh transmission in heavy-duty models provides new ease and efficiency.

### NEW CHEVROLET ADVANCE-DESIGN GEARSHIFT CONTROL



Steering-column gear shift (on models having 3-speed transmission) gives new freedom to the driver, leaves cab floor unobstructed.

### NEW FOOT-OPERATED PARKING BRAKE



Chevrolet's foot-operated parking brake (on models with 3-speed transmission) provides new clear floor area.

### NEW IMPROVED CHEVROLET VALVE-IN-HEAD ENGINE

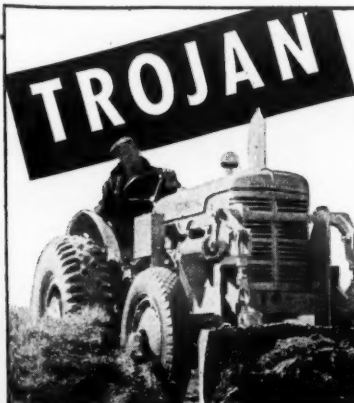


The world's most economical engine for its size. Has greater durability and operating efficiency.

### NEW MULTIPLE-FEATURE DEVELOPMENTS



New splined rear-axle shaft attachment to wheel hubs in heavy-duty models. . . Heavier springs . . . New propeller shaft bearing-support and seal design.



## Gets on the Job Fast . . . Cleans it up Fast ANGLEDZOZER

• Here's one of the handiest pieces of equipment you ever saw. It is a bulldozer *plus*. Besides the regular bulldozing position, it can be quickly and easily adjusted for six other angles. You always have exactly the right angle to do a particular job faster and better. And, Trojan's patented parallel lift mechanism always holds the blade steady—no flopping around. Mount a Trojan Angledozer on your Industrial Wheels. Make them do double duty. Easy to mount . . . easy to operate . . . low in costs. Let your International dealer give you all the angles on the ANGLEDZOZER, or write to Department CE-82.

CONTRACTORS MACHINERY CO., INC., BATAVIA, N.Y.

### Change of Address

(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York 16, today)

From \_\_\_\_\_  
(Former address)

To \_\_\_\_\_  
\_\_\_\_\_  
(New address)

Name \_\_\_\_\_

Firm \_\_\_\_\_

Position \_\_\_\_\_

## Distributor Doings

(Continued from preceding page)

belt in every pair of pants, it's prosperity; if you have to tighten your belt, it's a recession; if you have no belt, it's a depression; and if you have no pants, it's a panic."

### Ohio Dealer for Davey

G. W. Clements Equipment Co., Columbus, Ohio, has been appointed to a dealership by the Davey Compressor Co., Kent, Ohio. It will cover that portion of Ohio bounded by Wyandott, Crawford, and Richland counties on the north; Knox, Licking, and Perry on the east; Hocking, Ross, and Fayette on the south; and Madison, Union, and Hardin on the west. Company headquarters are at 476 Avondale Ave.

### Roller Dealer in Albany

Mott-Manbeck Machinery Co., Inc., has been appointed an exclusive distributor by The Buffalo-Springfield Roller Co., Springfield, Ohio. Located at 1030 Broadway, Albany, N. Y., the firm will cover the thirteen New York counties surrounding Albany.

### Ark. Dealer for O.K. Clutch

The Felix Green Machinery Co., Little Rock, Ark., has just been appointed exclusive distributor in the state of Arkansas for the O.K. Clutch & Machinery Co. of Columbia, Pa. The Green Co. handles the O.K. line of air compressors, hoists, and material elevators. Offices are located at 107 Rector St.

### Mich. Dealer for Gumout

The Mohawk Supply Co., 1925 W. Lafayette Blvd., Detroit 16, Mich., has been appointed distributor for Gumout in the Detroit area. Gumout, made by the Pennsylvania Refining Co., Cleveland, Ohio, is a solvent for cleaning carburetors and fuel systems. Mohawk also handles a complete line of industrial and automotive oils and greases.

### Barnes Dealer in East

H. E. Stone Supply Co., 2 E. Haddon Ave., Oaklyn, N. J., has been appointed a sales representative for the John S. Barnes Corp. of Rockford, Ill., manufacturer of hydraulic pumps and related equipment. The Stone Co. will cover metropolitan New York, the states of New Jersey, Delaware, and Maryland, and the eastern half of Pennsylvania.

### Mead Dealer in Western Pa.

Dravo-Doyle Co., Pittsburgh, Pa., has been appointed distributor in western Pennsylvania and eastern Ohio for the Mead Hevitrailer. This trailer is designed for hauling construction equipment weighing up to 25 tons.

### Brown-Strauss Adds Lines

The Brown-Strauss Corp., dealer of Kansas City, Mo., has recently added the products of two manufacturers to its lines of equipment. The company now handles the products of the B. F. Goodrich Co. and Tube Turns, Inc. For Goodrich, the firm carries the entire

line of industrial products including transmission and conveyor belts and hose of all types.

The Tube Turns line includes welding fittings and flanges up to and including 24 inches, in steel, copper, stainless steel, aluminum, etc. The Brown-Strauss offices are located at 1402-1720 Guinotte Ave.

### Three Dealers for Huber

Three dealers to carry its full line of road-construction and maintenance machinery have been appointed by The Huber Mfg. Co., Marion, Ohio. Smith, Inc., Construction Equipment Division, 1620 First Ave., No., Fargo, N. Dak., (Concluded on next page)



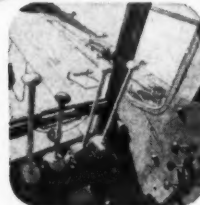
## WITH A MARION 33-M ¾ YD. SHOVEL

The MARION 33-M is designed and built to meet a vital need for a heavy duty ¾ yard machine that is FAST... VERSATILE... POWERFUL... one that will pile up yardage in "nothing flat". The MARION 33-M has many important and modern features that appeal to the contractor. It is sturdily built—easy to operate—easy to maintain due to readily accessible machinery—and is easy to convert from shovel to dragline, clamshell, crane or pile driver. Write for Bulletin 395. It will give you many reasons why a MARION 33-M should be working for you.



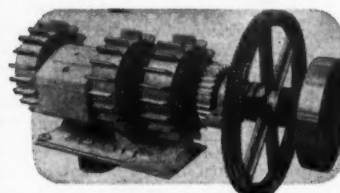
### IMPORTANT MARION 33-M

#### Features



#### AIR CONTROL

Every movement is air operated. Simple... fool-proof... full engine power applied gradually and smoothly to maximum pressure.



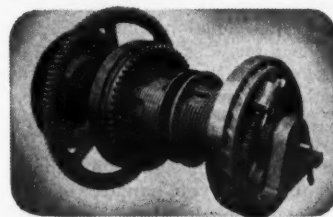
#### SWING SHAFT

Requires no adjustment at any time. Heat-dissipating fins assure cool running clutches.



#### INDEPENDENT BOOM HOIST

High speed raising and lowering of boom independent of all other operations.



#### HOIST DRUM SHAFT

Anti-friction bearings throughout for free-running and lower maintenance.

## COMPARE THE COST-BUY LA CROSSE

When you look forward to a busy season of contracting, hauling, or equipment moving... Look To La Crosse For Transportation.



### Looking for a good construction superintendent?

Advertise in the "Trading Post"  
See page 123

SEND YOUR AD TO:  
Contractors & Engineers Monthly

470 FOURTH AVENUE  
NEW YORK 16, N.Y.

## Distributor Doings

(Continued from preceding page)

will be sole distributor in the state of North Dakota and fourteen northwestern counties in Minnesota. Miller, Bradford & Risberg Co., Eau Claire, has been granted the distributorship for the western half of Wisconsin. And the Central Engineering Co., 4429 W. State St., Milwaukee, has been granted the southeastern Wisconsin territory.

### Mo. Dealer Adds Two Lines

Noel V. Wood, Inc., local distributor in Kansas City, Mo., has added two lines of equipment to its present list. The company is now local distributor for the Link-Belt Speeder Corp. of Cedar Rapids, Iowa, and for the Pettibone Mulliken Corp. and the Geo. Haiss Mfg. Co. Wood covers 55 counties in western Missouri, and 34 in eastern Kansas.

### Midwest Dealer Expands

The Globe Machinery & Supply Co. of Illinois, located in Moline, has recently purchased a 4-story building in Davenport, Iowa. The building is located at 402 E. 2nd St., and will serve to speed up delivery and customers' services. This company is affiliated with the Globe Machinery & Supply Co. of Cedar Rapids and Des Moines.

### Warehouse for Brandeis

The Brandeis Machinery & Supply Co. has added a new warehouse to its plant located at Brook and Warnock Sts., Louisville, Ky. It provides an additional 18,800 feet of storage space. Included in the warehouse is a separate spray booth for painting equipment.

### Cedar Rapids Dealer Moves

The McNall Machinery & Supply Corp. has relocated at 600 D Ave. N.W., Cedar Rapids, Iowa. McNall is distributor for Link-Belt Speeder Corp., Universal Engineering Corp., Worthington-Ransome Construction Machinery Division, Erie Steel Construction Co., and Transport Trailers, Inc.

### Nebr. Dealer for Hobart

The Island Supply Co., Grand Island, Nebr., has been appointed distributor in central Nebraska for the Hobart Bros. Co., Troy, Ohio. The company will handle the complete Hobart line of ac and dc arc welders, electrodes, and welding accessories and apparatus.

### Alberta Dealer for Euclid

Ferguson Supply Alberta Ltd., of Calgary has been appointed exclusive distributor by the Euclid Road Machinery Co. Ferguson will cover the entire province of Alberta.

### Robins Sales Expansion

In order to increase its sales and service facilities, the Robins Conveyors Division of Hewitt-Robins Inc., Passaic, N. J., has announced the appointment of a new dealer, the opening of a new sales office, and the leasing of a warehouse.

The Galigher Co., 545 W. Eighth South St., Salt Lake City, Utah, has been given exclusive sales rights in Utah and parts of Idaho, Montana, Nevada, and Wyoming. The new sales office is located at 5172 Tracy St., Kansas City, Mo. It is headed by C. Boyd Goodhart.

To speed the deliveries in Virginia, West Virginia, Kentucky, and North and South Carolina, the company has leased a warehouse at 1010 Penn-

sylvania Ave., Charleston, W. Va. The building will also house the Charleston office of Hewitt-Robins Inc., including field service personnel.

### Maintenance Check Chart For Electrical Equipment

A check chart for use in the maintenance of electrical equipment has been made available by the Westinghouse Electric Corp., 306 Fourth Ave., Box No. 1017, Pittsburgh 30, Pa. This chart covers the maintenance of motors, control equipment, wiring, fuses, transformers, and lightning arresters.

The chart is printed on one side of an 8½ x 11-inch sheet of paper. It describes all phases of maintenance and lists those things which have to be checked regularly. It tells what to look for, and how often routine operations such as lubrication should be undertaken.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 73.



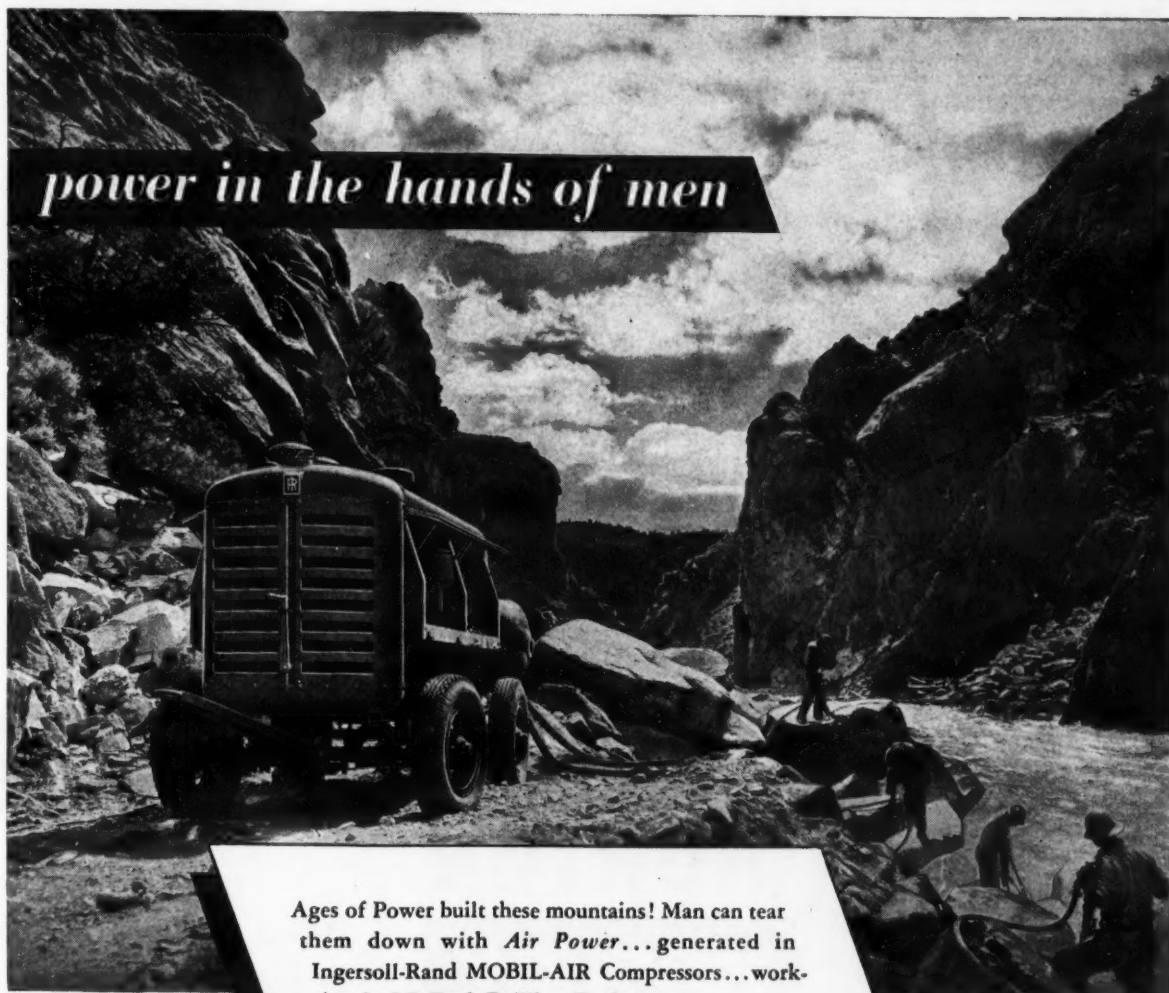
takes the headache  
out of

## AIR ENTRAINED CONCRETE

You can use it with confidence  
**DEPENDABLE**—Proved in the field  
Nationally distributed throughout  
the United States and Canada

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**DEWEY AND ALMY CHEMICAL COMPANY**  
CAMBRIDGE CHICAGO SAN LEANDRO MONTREAL



*power in the hands of men*

Ages of Power built these mountains! Man can tear them down with *Air Power*... generated in Ingersoll-Rand MOBIL-AIR Compressors... working in I-R Rock-Drilling Equipment.

MOBIL-AIR brings you *extra power*, the result of recognized MOBIL-AIR *quality* developed through years of creating and building out-in-front portable compressors that have always set the new standards of comparison... more air with less fuel, lower maintenance, easier to operate, greater dependability.

Today's MOBIL-AIR is stronger, sturdier, tougher, and better in every way. It is equipped with Drill-More Capacity Control, too. This gives your drills *more drill power*, makes your compressors last longer, and saves fuel.

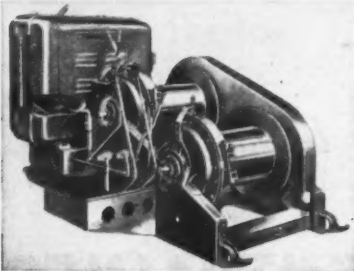
That's how the new KA-Series MOBIL-AIR puts another kind of power into your hands... *the power to increase your profit.*



COMPRESSORS • AIR TOOLS  
ROCK DRILLS • TURBO BLOWERS  
CONDENSERS • CENTRIFUGAL PUMPS  
OIL AND GAS ENGINES

# Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.



The new Jaeger Hydro-Hoists are made in capacities varying from 29 to 100 hp, and in one, two, or three-drum models.

### Feature of Hoists Is Direct Gear Drive

A line of hoists for use in the highway and heavy-construction industry has been announced by The Jaeger Machine Co., 710 Dublin Ave., Columbus 16, Ohio. Known as the Hydro-Hoist, they are made in capacities varying from 29 to 100 hp. The 29 to 40 hp Utility hoist is made in one and

two-drum models. The Erectors model is made with one, two, or three drums, and with a capacity range of from 60 to 100 hp. The Erectors are so designed that change from two to three-drum operation can be made in the field by the addition of a third drum.

These hoists have a two-speed automotive-type transmission for driving the drums. Clutching and braking are hydraulically controlled. Transmissions are designed for standard 1,800-rpm power units, either gasoline, electric, or diesel. To change to electric drive from gasoline or diesel, the clutch is removed, and a standard squirrel-cage motor is coupled directly to the transmission by means of a flexible coupling and adaptor bracket. Any of the three types of power units will be furnished as original equipment. The transmission and drum gears are connected to the transmission by a direct drive.

The hydraulic clutches are of the internal expanding-band type, and are said to be self-energizing and free of drag. They are provided with an adjust-

ment for wear located at the operator's station. The air-cooled hydraulic brakes have an outside adjustment. Precision-fabricated box-type frames and drums are made of rolled steel. The drums and drum shafts of the Erectors models turn in heavy-duty anti-friction bearings; the Utility

models are equipped with extra-large hardened-bronze sleeve-type bearings. Hydraulically controlled boom swingers are available for both models, and feature on-the-job attachment.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 45.



**With FELKER DI-MET HEAVY DUTY CONCRETE CUTTER**

**NEW**

CUTS FOR TRENCHES, RAMPS, WEAKENED PLANE JOINTS, PATCHES, CORE SAMPLES, ETC.

**Features:**

- 2 CYL., 10 H.P. GASOLINE ENGINE. Less vibration, greater power.
- POSITIVE WATER TURN-ON. Insures against dry wheel operation.
- HYDRAULIC DOWNFEED RETARDER. Eases diamond blade into concrete. No sudden shocks.
- DOUBLE END SPINDLE. For right or left hand operation.
- ONE MAN PORTABILITY.
- PRECISION BUILT. Engineered and built by DI-MET to insure maximum DI-MET diamond wheel performance. More power to spindle means constant cutting speed, longer wheel life.

NET WEIGHT 466 LBS. SHIPPING WEIGHT 600 LBS. MAX.

**DI-MET CONCRETE CUTTING WHEELS**

For longest wheel life and fastest cutting use Felker DI-MET Segmented Concrete Cutting Wheels... the blades with the holes and slots. Designed for greater coolant circulation, freer cutting.

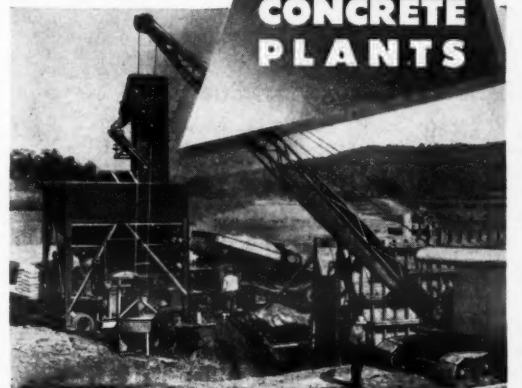
6" to 18" diameters. 6 1/2" max. depth of cut.

Write for further information.

MANUFACTURED BY FELKER MANUFACTURING COMPANY TORRANCE, CALIF.  
World's Largest Manufacturer of Diamond Abrasive Cut-off Wheels and Equipment  
OFFICES AND DEALERS IN ALL PRINCIPAL CITIES

### 1 - CONTRACT 8 - JOBS 11,000 Cu. Yards of Concrete 115 Moves

A 3/4 yd. Strayer Portable Concrete Plant averaged 24 cu. yards an hour under severe conditions, pouring 150 batches in one 5 hour period and paid for itself several times over. That was before the war — today's Strayer plant is easier and faster in operation thanks to fingertip hydraulic controls on all gates and many other design refinements.

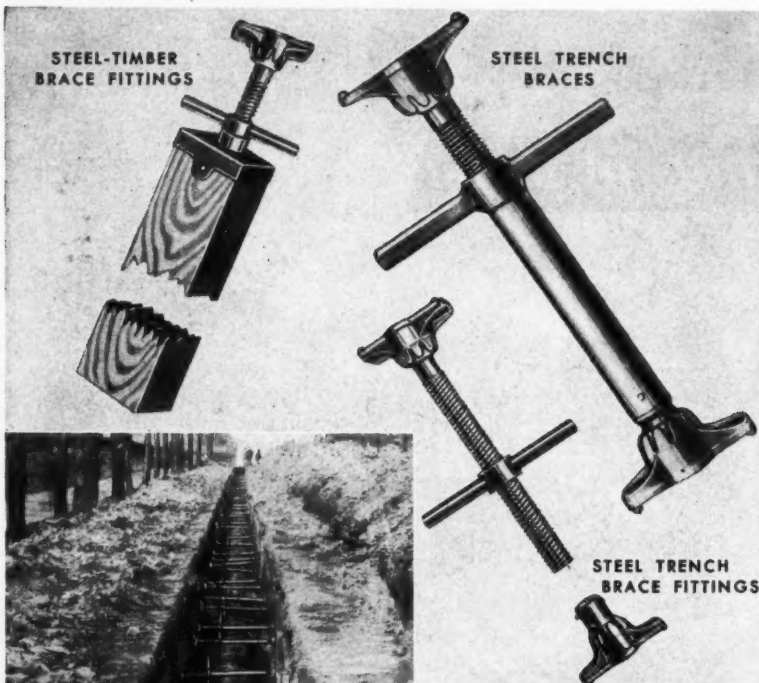


Write today for complete data on the Strayer Portable Concrete Plant that combines vertical conveyor to 3 compartment 20 cu. yd. Bin Storage—Weighing AggreMeter—Cement Pre-mixing—Accurate Water Control—Engine Drive. All mounted on 8-Wheeled chassis permitting moving from job to job.

### STRAYER Portable CONCRETE PLANTS

Erie Steel Construction Co., 284 Geist Rd., Erie, Pa.

BUCKETS • AGGREGATES • PORTABLE CONCRETE PLANTS



## DUFF-NORTON TRENCH BRACES

Quickly Installed—  
Eliminate Costly Cave-ins

Elimination of costly cave-ins makes Duff-Norton trench braces economical for all trench and excavation jobs. Constructed for rough outdoor use, they are safe and dependable. Ball and socket joint permits adjustment to any angle.

STEEL TRENCH BRACES. Supplied complete with either 1 1/2" or 2" pipe.

STEEL-TIMBER BRACE FITTINGS. Fittings include socket butt, butt end, screw and lever nut. Furnished without timbers.

STEEL TRENCH BRACE FITTINGS. Furnished with socket butt, butt end, screw and lever nut—without pipe.

Write for catalog, prices and recommendations on best braces for your needs.

SEE YOUR A. E. D. DISTRIBUTOR



THE DUFF-NORTON MANUFACTURING CO.

"The House that Jacks Built" PITTSBURGH 30, PA.

THE WORLD'S OLDEST AND LARGEST MANUFACTURER OF LIFTING JACKS

# Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney

## Grave Trouble Results From Blasting for Road

**THE PROBLEM:** A highway contractor followed a state highway department's plans and specifications in reconstructing a road. Did that fact exonerate him from liability when graves in an adjacent cemetery were partially destroyed during blasting operations?

**THE ANSWER:** No. That fact did not exonerate him if the blasting operations were conducted with knowledge of the probable result, and with reckless disregard of that probable result. So decided the Kentucky Court of Appeals. (Codell Construction Co. v. Miller, 304 Ky. 708, 202 S. W. 2d 394.)

The court said the evidence showed that the construction company knew the right-of-way ran along the edge of the cemetery, and that shooting the dynamite within 3 feet from the cemetery could be considered reckless, especially since the soil was loose shale. However, the Court of Appeals set aside judgement in favor of heirs of the deceased persons whose graves were disturbed, and it ordered a new trial, for two reasons. First, because the trial judge erred in telling the jury that the construction company could be held liable even if its employees were guilty of "mere carelessness". And second, because the Court of Appeals regarded an award of \$4,500 damages as excessive.

On the first point, the higher court said that the jury should have been instructed that the company was liable only if its acts "were done wantonly with reckless disregard of the right of next of kin of the deceased who were buried there". On the second point, the court thought that \$4,500 was an excessive award because there was no close relationship between the plaintiffs and the decedents and nothing to indicate that the plaintiffs really suffered any mental anguish.

## Foreman's Forgetfulness Is Employer's Misconduct

**THE PROBLEM:** The California Labor Code renders an employer liable for increased compensation when injury to an employee is caused by serious and willful misconduct of the employer or one of his "managing officers". Did the statute apply to injury of a rock-crushing-plant employee under the following circumstances?—the head operator of the screening machine started the machinery, forgetting that he had directed the laborer to enter the machinery to clear the screen of rocks.

**THE ANSWER:** Yes, declared the California District Court of Appeal. (Henry J. Kaiser Co. v. Industrial Accident Commission, 185 Pac. 2d 353.)

As to who may constitute a "managing officer", within the meaning of the statute, the court said: "A foreman, head operator, or other employee may be a supervisory employee, with bestowed powers of a supervisor or managing officer or directing head within the meaning of" the statute, "although such person has charge of but a small unit of an entire plant, if his invested authority is a general discretionary power of direction and control of an integrate department of his employer's business."

As to what constitutes "serious and willful misconduct" toward an injured employee, the court said: "There must be knowledge or the equivalent of knowledge, from all the surrounding circumstances, that the act or omission to act is likely to result in serious injury to others. In the present case the foreman knew that he had ordered the employee into such a position that if anyone pressed the switch button that set the machinery in operation, it became a position of danger."

## How State-Law Conflict Is Settled in Lawsuits

**THE PROBLEM:** A contractor canceled a contract to purchase sand and gravel for use on an airfield job in Maryland. The contract was to be performed in Maryland where the material was to be produced and delivered. But the dealer brought suit in Pennsylvania. If the laws of the two states differed on the question of measuring damages for the breach of contract, which was controlling?

**THE ANSWER:** The law of Maryland. So decided the United States Circuit Court of Appeals, Third Circuit (Washington Sand & Gravel Co. v. Brann & Stuart Co., 162 Fed. 2d, 826).

The question presented in the case was a matter of concern principally to the lawyers representing the respective parties. But every contractor should be aware that when his business crosses state lines, complications may arise if he fails to take notice of differences in state laws on identical subjects.

He should know that, as declared by the United States Supreme Court (Scudder v. Union National Bank, 91 U. S. 406, 23 L. Ed. 245): "Matters bearing upon the execution, the interpretation, and the validity of a contract are determined by the law of the place where the contract is made. Matters connected with its performance are regulated by the law prevailing at the place of performance. Matters respecting the remedy, such as the bringing of suits, admissibility of evidence, statutes of limitations depend upon the law of the place where the suit is brought."

## Employment Terminable; Contract Is Indefinite

**THE PROBLEM:** Was a construction company's clerk subject to discharge at the will of the company where he was employed under a written contract "for a period of not more

than two years on a weekly basis as a store-room clerk at a salary of \$57.69 per week?"

**THE ANSWER:** Yes, said the New York Supreme Court, Trial Term, Queens County (66 N. Y. Supp. 2d, 765). The court decided

that an agreement to employ someone for "not more" than a certain period cannot be interpreted as an agreement to employ for at least that period. It ruled that the contract (Concluded on next page)

## MARK FOR SAFETY

### ...SAVE WITH THE NEW WAY LINE MARKER

Keep your town safe . . . keep all crossings, safety islands, parking spaces clearly defined with the "New Way" Line Marker. No more brushing, spraying or pouring . . . R-o-l-l paint on the "New Way" to eliminate waste, cut job time from days to hours, reel off thousands of extra cost-saving yards daily. Gives sharp 4" line; tank holds 4 to 5 gallons; permits quick color change. No nozzles, pumps or hose to clog . . . simple, foolproof, trouble-free. Send for Bulletin 203.

NEWAYGO ENGINEERING CO.

NEWAYGO, MICHIGAN

OFFICES IN PRINCIPAL CITIES

THE New Way LINE  
Complete roll material  
conveying system, plus  
rollers, handles.

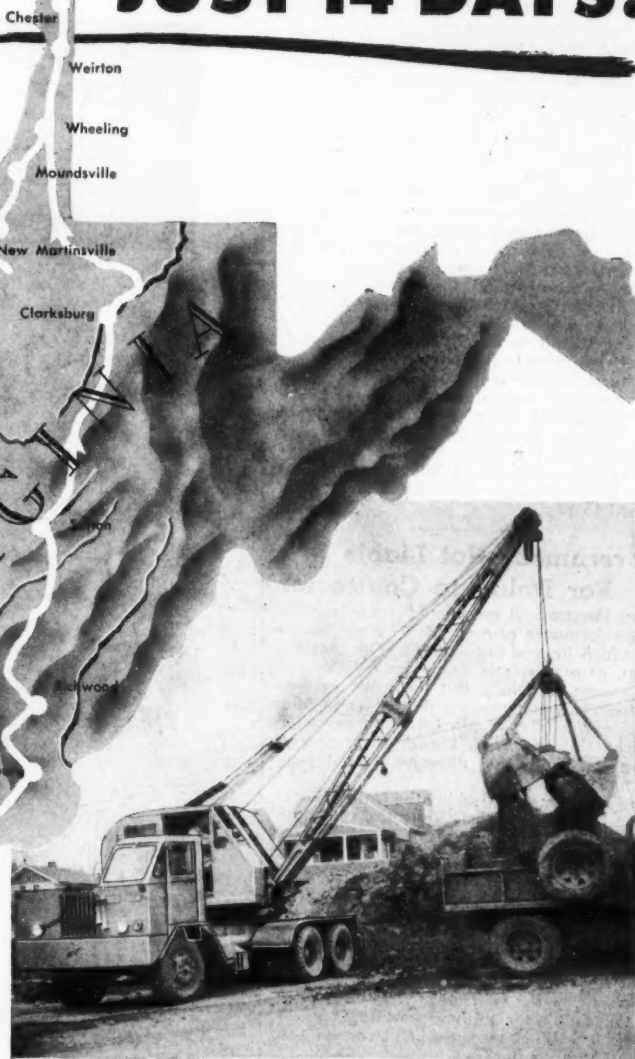


## ALL THIS IN JUST 14 DAYS!

WEAVER CRANE SERVICE, Inc.  
CHARLESTON, W. VA.

traveled 750 miles over  
mountain roads — set 31  
underground  
storage  
tanks in

11 West  
Virginia cities with a single  
**MICHIGAN**  
**TRUCK-CRANE**



## ...half the time required by less mobile equipment!

Weaver Crane Service, Inc., operates throughout the state of West Virginia, placing and removing underground storage tanks for a nationally-known petroleum company. They are highly pleased with MICHIGAN'S truck mobility and stamina on the mountainous roads of West Virginia. In the words of Mr. Albert Weaver, "it has given exceptionally good service . . . Had this work been done with a less mobile machine, the same trip

would have taken at least thirty days . . . I am proud of my MICHIGAN Crane."

This is typical of the praise of MICHIGAN Shovel-Crane owners everywhere. Get all the facts about MICHIGAN — ask for your copy of "MICHIGAN ON THE JOB" which graphically shows the wide range of cost-cutting applications of these pioneer mobile shovel-crane.

**MICHIGAN**

**MICHIGAN POWER SHOVEL COMPANY**  
490 SECOND STREET • BENTON HARBOR, MICHIGAN, U.S.A.

## Avoid Legal Pitfalls

(Continued from preceding page)

was not merely ambiguous, so as to permit hearing of testimony pro and con about the actual mutual understanding of the parties as to the duration of the contract. For lack of reasonable certainty, the employment must be deemed to be for an indefinite period and terminable at the will of either party.

The court intimated that the contract might have been interpreted as one for at least two years' employment had the document as a whole disclosed mutual intention to that effect. But there was no clause in the agreement to indicate such intention.

### Equipment Lessor's Claim On Contractor's Bond Upheld

**THE PROBLEM:** A municipal construction job was covered by a bond which required the contractor to "satisfy all claims and demands incurred" in doing the work, and to "pay all persons who have contracts directly with the principal, or any subcontractor . . . for labor or material". Did the bond protect those who rented to the contractor the pneumatic machinery and incidental equipment needed to bore holes in a dam, although this equipment was not in constant use?

**THE ANSWER:** Yes. (Owsley v. Henderson, 45 S. E. 2d 263, decided by the North Carolina Supreme Court.) The court said: "To answer the question it is not necessary for us to decide whether the rental cost of such equipment is labor or material. The answer . . . is to be found in the broad and inclusive language of the bond itself."

The Supreme Court rejected a contention that the bond covered rental of machinery and equipment only while the same was in actual use. It drew a parallel between the particular job and cement spreading:

"Those who spread the cement must at times await those who haul the material and the haulers must abide the loaders. Surely no one would seriously contend that such employees must have their wages doctored for idle time. Neither is it reasonable to say that the contractor may refuse to pay the rental for 'mechanical labor equipment' when not in actual use. It must be 'on the job', ready at hand when needed, and the contractor must pay for the time it thus serves his purpose. In the event he defaults, his surety has agreed to pay."

### Government Not Liable For Delay to Contractor

**THE PROBLEM:** A contractor was delayed in his performance of a contract by two causes for which he was not at fault. The Government, as owner, was liable for only one of the causes of delay. But the evidence presented did not permit a finding as to how much of the delay resulted from the cause for which liability existed. Was the Government, therefore, liable for damages to the contractor?

**THE ANSWER:** No, decided the United States Court of Claims. (J. J. Kelly Co. v. United States, 69 Fed. Supp. 117.)

### Contractor Will Not Build Haulage Bridge for Sub

**THE PROBLEM:** A subcontract for haulage of excavated materials on a channel-improvement project provided that bridges "deemed necessary by the contractor" would be built by the contractor without cost to the subcontractor. What measure of power did this give the contractor?

**THE ANSWER:** Said the United States Circuit Court of Appeals, Seventh Circuit, in the case of Albrecht Co. v. New Amsterdam Casualty Co., 164 Fed. 2d, 399: "The words of the contract 'deemed necessary by the contractor' did not permit it whimsically to refuse to build a bridge. Its action was subject to the test of its fraud or bad faith in reaching its decision. If, in bad faith, it refused to build a bridge for the subcontractor, it could not escape liability because of the words of the contract." However, it was decided that neither fraud nor bad faith was proved.

The damage suit was brought by the contractor against the subcontractor for the latter's failure to perform the subcontract. The subcontractor based his counterclaim upon the contractor's failure to construct a temporary bridge that would have facilitated haulage of the excavated material. But the court dismissed this counterclaim.

Said the court: "The evidence clearly established these facts: The gain to the defendant [subcontractor] from a bridge was dependent in a large degree on the condition of the weather. The nature of the ground [fresh fill] over which the larger diesel-engine trucks would have to travel if the shorter route were pursued made its use impossible in rainy weather. There existed a

route traversable at all times which the truckers not only could use, but did use."

### Bid Correction Is Allowed

**THE PROBLEM:** In this case, there was no charter or statute which required competitive bidding for a contract to lay a municipal water pipe line. Did the awarding board have a right to permit the successful bidder to change his bid, by striking out an escalator clause, and by correcting mathematical errors?

**THE ANSWER:** Yes. (Demos Bros. General Contractors v. City of Springfield, 76 N. E. 2d 166, decided by the Massachusetts Supreme Judicial Court.) The court noted that the water board "was not even obliged to ask for competitive bids, although it did so in this instance".

### Liability For Child's Death Ark. Dealer for O.K. Clutch

**THE PROBLEM:** A ten-year old boy was killed by a cave-in while he was playing in an excavation which road contractors had made to secure material for a fill. The place was on public property, where children had played for years. Were the contractors liable in damages?

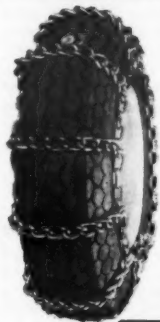
**THE ANSWER:** Yes, said the Oregon Supreme Court (Pate v. Parker, 177 Pac. 2d

250). To the contractors' claim that they did not know that children commonly played there, the court replied:

"The general nature of the operation, its location and proximity to a thickly settled neighborhood, and the fact that it was public property, a sand bank, unfenced and unguarded, imputed to appellants [the contractors] the knowledge that the premises would in all likelihood be used by the children of the neighborhood upon which to play in the absence of appellants from said operation. The inherent inclination of children to roam the neighborhood and to play with

anything that it seems to them will afford some enjoyment is known to everyone. . . . If there is anything more attractive to children than a good tree to climb, it is a good sand bank in which they can play, dig holes, and climb."

The court decided that since the site was unposted public property the children could not be regarded as trespassers. It also decided that the evidence showed negligence on the part of the contractors in leaving an overhanging ledge at the top of the excavation, and in failing to maintain a watchman, a barricade, and warning signs.



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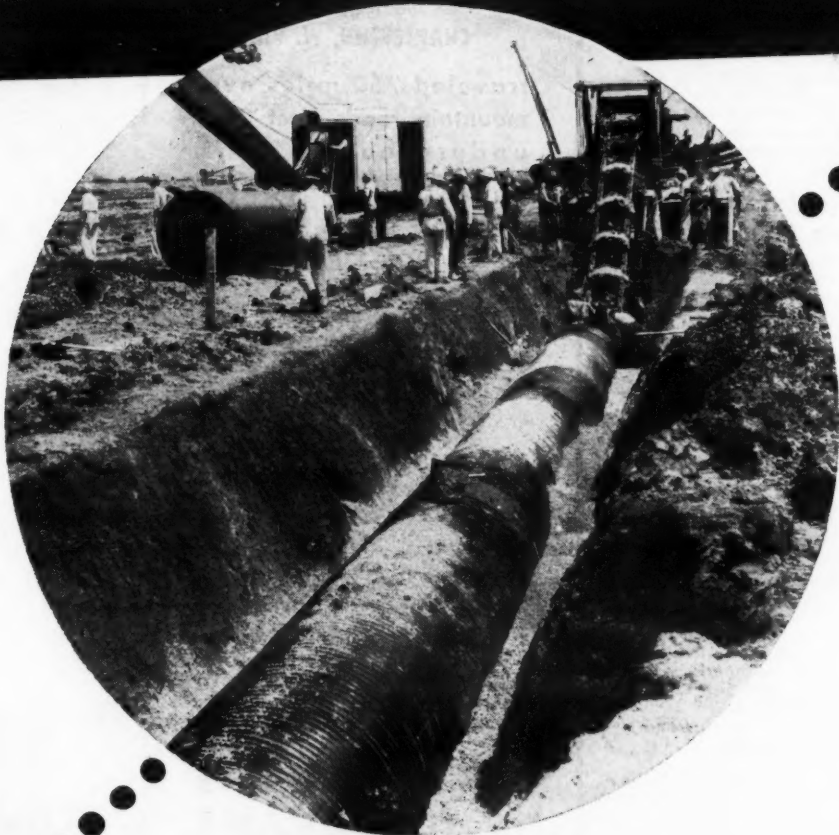
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**ARMCO DRAINAGE PRODUCTS**

# County Road-Mixes New Asphalt Mat

**Motor Graders and Mixer  
Run by County Crew Lay  
16 Miles of Bituminous  
Top in 20 Working Days**

IN only 20 days of working time, a new construction crew of Vernon County, Wis., finished preparing and mixing 16 miles of highway between Viroqua and La Farge, in western Wisconsin. The work, done with state funds on State Route 82, makes that highway a fast all-weather route.

Including the previous contract work by Ed Kramer & Son, of Plain, Wis., the new route cost only \$5,750 per mile. Kramer's contract included crushing and placing about 44,000 yards of ¾-inch-minus aggregate, traffic-bound in place, and bladed level. As finished by Vernon County's crew, the new road has from 5 to 7 inches of good crushed sub-base, and about 2 inches of road-mixed bituminous top.

Built by county equipment and men at a speed of a mile per day, the bituminous topping marks a rather new trend in the state of Wisconsin—a trend towards improving the already good system of state secondary roads by laying a more permanent type of surface. This work was noted for its good organization and the speed with which the material was road-mixed. The new finished surface is 22 feet wide.

## Asphalt Comes to Viroqua

The SC-6 asphalt was supplied by the Ohio Oil Co., and shipped to the Viroqua siding at the county yard from a refinery at Lovell, Wyo. After such a long trip, of course, the asphalt had cooled down.

Recently the County purchased a new Bros tank-car booster, and this unit took care of re-heating the SC-6 material to a temperature of about 190 degrees. In the past, quite a bit of difficulty had been experienced "breaking the cars loose" when they had cooled. With the exception of a few very cool days, however, when a Bros steamer also had to be used, the booster successfully handled the cold asphalt and brought it up to application temperature in about 3 hours.

Two Etnyre pressure distributors then took their loads of asphalt through the Bros booster and hauled the material out to the job. Work proceeded so rapidly that demurrage on the cars was not a problem.

## Fast Road-Mixing Methods

The new route was topped in sections a mile long. Each section was handled usually in one long day's time, by working all machines at full speed.

Equipment assigned to the job from Vernon County's roster of machines included an Adams Model 512 motor grader, a Caterpillar No. 12, a Galion No. 101 motor grader, an International-drawn Seaman Pulvi-Mixer, two Etnyre asphalt distributors, and a Galion 12-ton tandem roller. In the order of their appearance, the road-mixing machines performed something like this:

1. One of the motor graders cut a windrow off the top of the crushed sub-base surface, and piled it at one side of the highway. The volume of this windrow was as close to 15 cubic yards per 100-foot station as could be cut. Dimensions of the windrow were checked frequently to see that the volume was right.

2. The windrow was then flattened by a motor grader so the pressure-distributor truck could pass over the surface.

3. The first of ten shots of SC-6



C. & E. M. Photo

asphalt was then applied by an Etnyre distributor at the rate of 1,000 gallons to the mile. Total asphalt volume of the 587.5-cubic-yard windrow per mile was scheduled to be 10,000 gallons. Ten separate 1,000-gallon shots were applied, and after each spread at 190

degrees F the windrow was given the following manipulation:  
A motor grader bladed the material

back into a windrow. The first pass of the Seaman Pulvi-Mixer was made to  
(Continued on next page)

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C. &amp; E. M. Photo

As the day ends, motor graders on the Viroqua-La Farge road work the material towards the center in preparation for the division and final laydown.

### County Road-Mix

(Continued from preceding page)

distribute the bitumen evenly throughout the aggregate. The two other motor graders followed the Pulvi-Mixer to blade the material twice more. This process was repeated until the win-

drow was turned 12 times by motor-grader blades and three times by the Seaman Pulvi-Mixer. After each application of mixing the windrow was flattened again for the next shot.

4. After the final shot of asphalt, and road-mixing by the equipment, the windrow was laid back in the center of

the highway and flattened. This and the succeeding steps are most important, and resulted in a good surface.

5. A motor grader then passed through, took half the windrow, and laid it over to one side. Another grader bladed the remaining material to the opposite side of the highway.

6. Two passes were then made. On the first pass the material from one side of the road was bladed towards the other side. All three machines, working in tandem with each other, made this pass. They then reversed themselves and swept the remaining material back over the highway. Entire distribution of road-mixed material was done in these two passes and resulted in excellent riding surfaces.

7. A Galion 12-ton tandem roller then moved in to make two complete rolls over the highway. After rolling, the surface was not sealed nor chipped.

### Cost Distribution

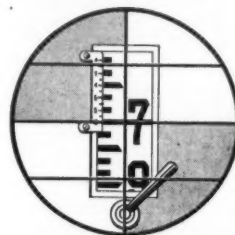
Costs of the finished work were easy to compute. An average of 3,000 cubic

yards of \$1.49 sub-base gravel was laid, the cost of asphalt was \$850 per mile, and rental on equipment and the labor involved ran an average of \$400 per mile during the mixing.

The County allowed Harold Hansen, its Construction Superintendent on the job, all the leeway he needed to make a nicely finished roadway. Through some of the boggier spots, for example, he

(Concluded on next page)

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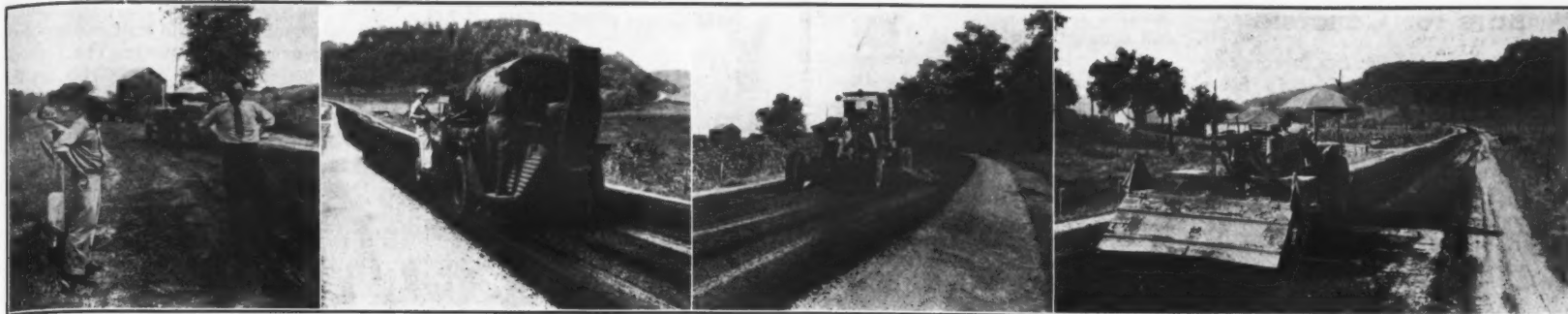
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C. & E. M. Photos

First photo: Superintendent Harold Hansen, left, and Vernon County Commissioner M. J. Roidt inspect a windrow on a Wisconsin State Route 82 road-mix job. Second: an Etnyre pressure distributor applies a 1,000-gallon shot of SC-6 asphalt to the windrow. Third: an Adams motor grader followed by a Gallion 101 machine start the mixing process. Fourth: a Seaman Pulvi-Mixer goes to work behind the motor graders.

increased the sub-base. On each pass of the distributor he rode with the operator to judge whether various places were rich, lean, or just right.

#### New Road Will Solve Problem

Completion of this new surface over the old alignment solves a serious traffic problem which reached a climax during the winter of 1946-47. Extremely wet conditions caused the road to fail over much of its length. Trucks mired down. The old oil mat gave way. Re-grading, the application of a heavy course of crushed-rock sub-base by contract, and the topping work performed by Vernon County should give a road that will now stand up under heavy traffic in almost any weather, according to the engineers who have seen it.

The job was done under the immediate field supervision of Harold Hansen, acting under the general direction of County Commissioner M. J. Roidt of Viroqua.

Construction of this type, as well as the maintenance of state highways, is a regular function of counties in the state of Wisconsin.

#### No-Load Build-Up

##### Permitted by Clutch

A clutch with a variable pitch diameter is manufactured by W. S. K., Inc., Donovan Bldg., Detroit 1, Mich. It is designed to allow the power unit to which it is attached to accelerate to nearly full speed with no load attached. For this reason, it is especially recommended by the company for pulling loads which require a high starting torque. A mechanical advantage over the load is said to be gained at the time of contact, due to the fact that the clutch engages at a smaller diameter than that at which it operates.

The speed at which the V. P. D. clutch engages and disengages is predetermined by design, and is adjusted during manufacture to the user's requirements. Normally it is set to engage at 1,400 rpm under no load, and 1,700 rpm under full load. The unit is supplied complete with a built-in key and a locking set screw. It can be installed on the shaft with either the clutch body or pulley end next to the engine, as the clutch will work in either direction.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 50.

#### New Electric Eraser

An electric eraser for use in drafting rooms is available from the Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill. The Handee eraser is said to be balanced and shaped to fit the hand comfortably. As a safety feature, all moving parts except the eraser tip itself are completely covered by a protective sleeve. Total weight of the unit is 12 ounces.

The manufacturer explains that the eraser chuck will handle any of the standard erasers. Optional equipment includes a foot-operated speed control which leaves both hands free to handle the eraser.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 8.

#### U.S. Fuel Supply Discussed

The present situation regarding our supplies of coal, oil, and other fuels is discussed in a report made available by James Leffel & Co., Box CEM, Springfield 99, Ohio. The report is a reprint

of a publication entitled "Fuels of the Future", which was prepared by Ralph Sherman, Supervisor, Fuels Division, Battelle Memorial Institute, Columbus, Ohio, and issued by the Institute.

In this report, Mr. Sherman goes into all phases of the subject. He discusses

our fuel reserves, our probable needs, and the possibility of imports of various fuels. He discusses conservation of petroleum, and conversion to the use of other fuels. He discusses natural gas, the use of coal in the manufacturing of other power, and the possibility of the use of various kinds of chemicals as fuels.

Copies of this literature can be obtained from the company. Or use the enclosed Request Card. Circle No. 63.



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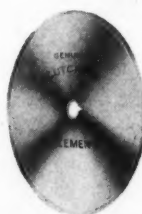
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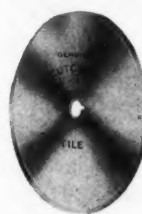
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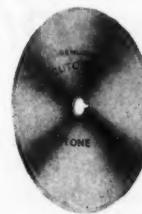
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Other features claimed for the Webrib Bar are that all bars during the spiral bending are subjected to high stress which discloses all inherent defects such as pipes, seams, etc.; also the

absence of mill scale, ease of handling and symmetry in concrete.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 25.

## Data on Centrifugal Pumps

A folder describing three of its light-weight centrifugal pumps has been prepared by The Gorman-Rupp Co., Mansfield, Ohio. These are the Midget  $1\frac{1}{2}$ -inch pump, the Hawk 2-inch pump, and the Eagle 3-inch pump.

Bulletin No. 7-LW-13 describes the general characteristics of the pumps, shows several of the uses to which they can be put, and also lists the performance features claimed for them. Cut-away drawings show the Gorman-Rupp-designed priming and pumping action. A graph shows the performance curves for each of the three pumps mentioned.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 66.

## Sander Backing Pad

A new type of backing pad for use with disk sanders is produced by The Pratt Mfg. Co., Inc., 614 E. Madison St., Fairmount, Ind. It is made of layers of rubber reinforced with fabric and securely bonded to a slotted iron hub.

The slots in the hub are designed to force air through to the back of the

sanding disk. In this way, the manufacturer explains, the unit is kept cool under even severe usage. The forced-draft action through the spirals on the pad is also said to keep the abrasives clean. The pads are designed to permit flexibility in working around objects.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 47.

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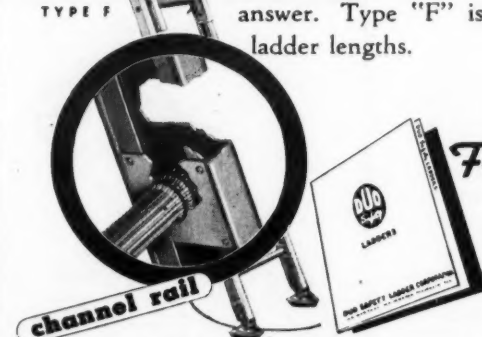
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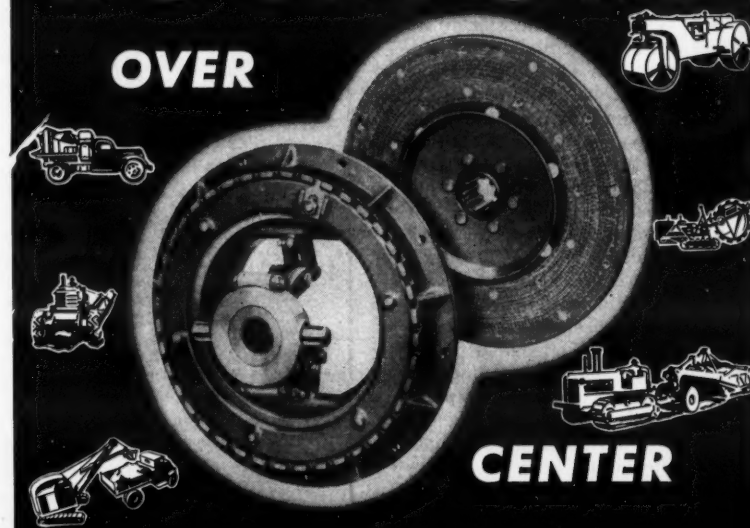


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# Roads and Roadsides Discussed at Meeting

## 7th Annual Short Course Covers Planning, Safety, Other Phases of Roadside Work at 2-Day Session

† HIGHWAY planning and design, safety, and special roadside problems were discussed at the Seventh Annual Short Course on Roadside Development held in Columbus, Ohio, February 11-14. Approximately 190 landscape and highway engineers, contractors, and others concerned with highways and roadsides attended this conference sponsored jointly by the Ohio Department of Highways and Ohio State University. Representatives of 14 states, the District of Columbia, and two provinces of Canada joined in the discussions on planning, building, and maintaining "the complete highway". Introductory remarks were made by Dallas D. Dupré, Jr., Landscape Engineer of the Ohio Department of Highways, and Professor Charles R. Sutton, Department of Landscape Architecture, Ohio State University. Then Dean Charles E. MacQuigg of the University's College of Engineering extended a welcome to the gathering. He emphasized the value of such opportunities for an exchange of information and discussion of common problems.

Presiding at the first session was C. E. Swain, Division Engineer for Division 2 of the Public Roads Administration. Mr. Swain pointed out that 10 or 15 years ago the attitude of the engineering profession was that all beauty is superfluous; that straight lines and utility are the thing. Then landscape architects entered the highway field, and too much attention was given to appearance. Now the two groups have become acquainted, to their mutual benefit, since each has much to contribute to the solution of the other's problems.

### Planning a Highway

First speaker on the program was Roy E. Jorgensen, Deputy Commissioner and Chief Engineer of the Connecticut State Highway Department. He pointed out that today, highway planning must be based not on volume of traffic alone but on the character of the traffic to be served. As the character of traffic varies considerably, origin and destination surveys are most important, since they give the key to traffic's needs.

Since traffic safety is one of the major objectives in modern highway design, Mr. Jorgensen believes that highway engineers should be more critical of our roads and less inclined to charge off accidents to the carelessness of motorists. For, he pointed out, even though an accident may result from carelessness—such as crossing the center line and colliding with opposing traffic—such accidents could not occur on modern, properly designed highways. In proof he cited the safety record of the Merritt Parkway in Connecticut, and the Davison Expressway in Detroit where only one fatality has occurred in five years.

Consistency of design is extremely important, Mr. Jorgensen said, with no surprises for the motorist. The highway should be wide enough, straight enough, and flat enough to provide safe operation at reasonable speeds. Median strips to separate opposing traffic eliminate head-on collisions. Grade separations are essential—almost half of all accidents are at intersections—but cloverleaves and interchanges must be simple and consistent with the speeds encouraged by modern expressways.

Access from abutting property should not be permitted; rather, traffic must enter and leave at established connecting roads only. If no pedestrians are allowed on the highway, the present rate of pedestrian accidents—over one-third of all fatalities—will be diminished.

The present safety records of expressways put the responsibility for fewer traffic accidents on highway administrators. They must bring to the motorist the safety which only modern highways can bring. But, Mr. Jorgensen said, those better safer records should be reported to the public, so that the public will know what the very large expenditures of money for expressways will buy in safety. He also urged keeping better safety records from which

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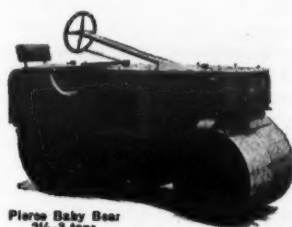
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## Roads and Roadsides Discussed at Meeting

(Continued from preceding page)

the highway engineer can predict potential hazards and the improvement in safety resulting from improved design.

As to right-of-way for modern highways, the same factual approach should be taken towards this as towards all other phases of highway design. It is difficult, if not impossible, to standardize on right-of-way widths, he said, particularly in urban areas. But sufficient right-of-way must be taken for proper design and roadside development. When studies are made of proposed routes in urban areas, a roadside-development study should be made at the same time, and sufficient right-of-way—but no more than is necessary—should be taken.

### Design and Safety

The recent change in thinking about highway design and safety was discussed by Wilbur H. Simonson, Chief, Roadside Section, Public Roads Administration. The need for control of the development along the roadside has become a vital factor in highway safety, Mr. Simonson said. While safety can be built into the highway, control over the right-of-way and of access is needed to protect those values.

Security is important to everyone. Safety or security on the highway may be broken down into three elements: structural, functional, and psychological. The structural element is obvious, of course, and is concerned mainly with materials and what is done with them. The strength and stability of pavements, embankments, and bridges make up this element. The second element, the functional, is concerned with the adequacy of the highway in terms of traffic operation—the number of lanes, etc. The third is the driver's feeling of security. Driver actions and reactions are determined by what he sees and what he doesn't see. Psychological safety is a matter of mind as well as of vision, Mr. Simonson pointed out. While we cannot measure this third factor, it is just as important as the first two, since such a large percentage of our accidents involve failure of the human element.

This is where the concept of the complete highway—from right-of-way fence to fence—comes in. For example, ample right-of-way can relieve monotony and thus contribute to psychological safety. The "new look" in drainage practice—wide ditches, well graded flattened slopes, streamlined cross section—are not only more economical and safer but contribute to the psychological safety factor.

The complete-highway cross-section design calls for adequate pavement, shoulders, slopes, roadsides, and turn-outs and loading points beyond the shoulder edge. To provide adequacy in these elements, sufficient right-of-way and control over it are necessary. "Safety", Mr. Simonson concluded, "is primarily a matter of adequate space and of making the best use of it".

### Chemical Weed Killers

The latest developments in weed control with chemicals was the subject of the first session's final paper, presented by Dr. C. J. Willard, Associate in Agronomy, Ohio State University. Dr. Willard outlined the development of 2,4-D and related herbicides, and their characteristic of selective killing. He discussed their various forms and where they should be used. He warned, however, that there is still much to learn about the use of 2,4-D, and stressed the danger to crops on adjoining fields from drift. Low pressure for the spray and some type of curtain were recommended.

Dr. Willard also warned against uncontrolled killing of weeds, pointing out that as we use more chemicals for weed control, we upset the balance of nature. As 2,4-D destroys legumes, grasses are deprived of nitrogen and eventually will be destroyed.

A new type of weed killer, 2,4,5-T, was reported as in the experimental stage, and it may prove to be an advance in this type of weed control, he said.

### Urban Planning

At the dinner meeting, Murray D. Shaffer, former Ohio Director of Highways and now Director of Sales for Buffalo - Springfield Roller Co., presided. Speaker of the evening was Robert Kingery, General Manager of the Chicago Regional Planning Association. Mr. Kingery outlined how Chicago's suburban cities and villages collaborate with each other and with state and county highway officials in planning, financing, and scheduling the construction of the connected system of inter-community streets and highways. Several specific examples were described wherein county and city subdivision regulations have helped to protect designated broad highways from encroachment of building lots. Instances were also related under which municipal and county zoning ordinances have effectively guided the sound expansion of business and industry—while protecting residential sections from invasion by auto junk yards and other non-residential uses of property.

"In the middle 1920's", Kingery said, "most of the vacant land in suburban

Chicago was rapidly being divided into lots, without reference to the planned state and county highway systems. The cities and counties drew up and adopted street and highway plans, and finally uniform subdivision ordinances which required the dedication of wider right-of-ways for such main thoroughfares in the plats of subdivision. Highways

ranging from 80 feet to 300 feet in width have been established and a substantial mileage of right-of-way has been obtained in this manner. Such broad highways permit adequate space for divided pavements, sodded slopes, planting of trees, drainage, and all the desirable features of the completed highway.

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"Zoning has attained fairly complete acceptance in Chicagoland", Kingery added, "with 145 municipalities having adopted zoning ordinances, representing over 90 per cent of the incorporated population. In addition eight counties, one in Wisconsin and seven in Illinois, have adopted zoning regulations, which now give similar protection to more than 60 per cent of the rural population in the fifteen-county Region of Chicago. The zoning commissions, boards of appeal, enforcing officers, and attorneys meet frequently to exchange experiences and to harmonize their practices in many details, all in the interest of better planning and administration."

#### Roadside Conservation

The technical and lay approach to planning and roadside conservation was the theme of the second day's morning session. Torbert Slack, Roadside Development Engineer of the Louisiana Department of Highways, presided. First speaker was M. E. Bottomley, Professor of Landscape Architecture, University of Cincinnati. Professor Bottomley pointed out that the roadside-development engineer must coordinate the interest and desires of the traveling public in order to make our highways useful, safe, and also attractive. He urged that the assets along the roadsides be emphasized and developed, and the liabilities subordinated.

One major objective in roadside planting, Professor Bottomley said, should be to relieve monotony. Long stretches of open spaces should be broken up. "There should be, at intervals, something spectacular and really interesting, instead of monotonous and even development," he said. However, any planting done should have variation in spacing to give informality. The roadside park provides such a change in the landscape, as well as an opportunity for rest and relaxation. In flat rural country, a planting of trees near a farm house, or across the road from it serves to break up long stretches of open country.

He reminded the gathering that their objective is to improve roads, not to disguise them, but urged that any planting be in character with the roadside and surrounding landscape, with an informal effect. This casual quality may be achieved not only by arrangement but by the type of trees or shrubs selected. He suggested mixed planting, and urged that roadside engineers increase the varieties of plants used, keeping in mind always that they must be trees or shrubs that will grow, require the minimum of maintenance, and achieve the desired effect.

The layman's point of view in regard to roadside development was presented by Miss Ethel L. Larsen of Manistee, Mich., National Chairman of the Conservation of Natural Resources Committee, General Federation of Women's Clubs. Miss Larsen outlined the development of interest by the Women's Clubs in our roadsides, and cited a number of cases where an irate citizenry had taken steps to conserve natural beauty along the roadsides.

One of the values of such an exchange of point of view between layman and highway engineer was indicated by some of these examples. It becomes increasingly evident that where the public is told the objectives behind a highway program or a particular project, its understanding and support can usually be secured. But where a highway department does not realize the importance of good public relations, and fails to tell those who are most concerned the reasons for realigning a road and removing a pet tree in the process, considerable ill will may result. The time and trouble involved in taking into its confidence the individuals affected by such changes can reap a worthwhile reward in public good will towards the highway department.

Mrs. Vance Hood, Chairman of the

Blue Star Highway Committee of the National Council of Garden Clubs, outlined the Club's plan for the Blue Star Highway. This is a project to have a connected route throughout the country, designated the Blue Star Highway, as a tribute to the men and women who served in the armed forces during the war.

Final event in the morning session was a film and talk on training tree-pruning personnel by Ralph Kauffman, Director of Personnel Training and Research of the Asplundh Tree Expert Co. The film showed not only the training procedure, but equipment and methods used in tree pruning.

Mr. Kauffman pointed out that there are some 80,000,000 utility-line poles in the country, mostly along roads, and therefore line clearance is a very big job. He believes that the presence of utility lines along the roadsides need not interfere with roadside development; that if men are properly trained in tree growth and in proper methods of

(Continued on next page)

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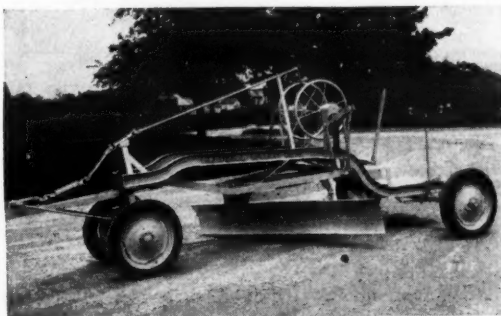
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## Roads and Roadsides Discussed at Meeting

(Continued from preceding page)

tree care, roadside trees may be so pruned as to clear utility lines and at the same time conserve their conformation and their growth.

He urged further cooperation between highway officials, utility companies, and line-clearance people. He believes that there is no need to lose trees or spoil them because of utility lines, and that all line-clearance problems can be solved by cooperative effort.

### Panel on Roadside Work

The final session of the Seventh Annual Short Course was devoted to a discussion of roadside problems and progress, with Frank H. Brant, Landscape Engineer of the North Carolina Highway and Public Works Commission, presiding.

F. J. Salter, Associate Professor of

Agronomy, Ohio State University, discussed fertilizers, limes, and mulches, and their part in establishing roadside vegetation. He pointed out that most roadside soils do not provide suitable conditions and nutrients for plant growth. Soil factors must permit root growth on which plant growth depends, and therefore sufficient aeration, moisture, and nutrients must be present.

Professor Salter reported on experiments with various types of fertilizers and combinations thereof. These indicate the value of organic matter and high-nitrogen fertilizers for use on roadsides. His recommendations for insuring good roadside growth were: good topsoil with sufficient organic matter; the use of a superphosphate or its equivalent, worked into the top 4 or 5 inches of soil; and, just before seeding, a fertilizer of the type indicated by soil analysis. In Ohio, this is 25 to 40 pounds of 10-6-4 per 1,000 square feet. For acid soils, lime should be used in order to bring the soil to a pH 6. In Ohio, this may be achieved by about 100 pounds

per 1,000 square feet once every 6 to 8 years.

In the use of mulches, Professor Salter warned against too heavy a layer as it may keep the soil too wet. When properly spread, however, mulch is a great aid in the establishment of sod, he said, because it helps to regulate moisture, lessen run-off, hold water, and prevent erosion.

The final feature of the session was a panel discussion during which landscape engineers from the various states represented reported on their most outstanding or unusual achievements in roadside work.

Dallas D. Dupré, Jr., of Ohio, described that state's willow-mat protection for stream slopes. Harold J. Neale of Virginia reported on its project to encourage highway zoning, in order to prevent increased costs for moving buildings on the right-of-way in the course of carrying out its 20-year highway improvement program. Connecticut's policy of doing slope stabilization

(Continued on next page)



Pouring concrete over Bethlehem Reinforcing Bars, shown in place atop one of six culverts built for new road.

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Joseph Powers, junior engineer (left), and Austin Sarr, resident engineer, both of N. Y. State Highway Dept., glance approvingly at one of numerous construction details encountered on the job.



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work as soon as a slope has been accepted by the State, and before a grading contract is finished, was described.

John Freeman of Alabama told of the very different roadside problems in the northern and southern regions of his state. He reported that in the big problem of erosion control in the south, items affecting it are provided for in the specifications and included in all contracts for highway work. In Illinois, Albin Gries reported, an official policy of considering roadside development at the time of planning a highway project has been adopted. This integrated action means that such factors as sight distance, salvaging of topsoil, tree protection, conservation of natural beauty, rounded slopes, seeding of shoulders and slopes, planting, and picnic areas are considered at the time of planning and design, and such items as are required become a part of the project plans.

Indiana's new roadside parks and its experiments with 2,4-D were described by George Brown. Franklin Rose of Kansas reported on his state's policy of handling all roadside seeding by contract. It is paid for on the basis of pounds of seed used and planted.

Of all the phases of roadside development under his jurisdiction, Torbert Slack of Louisiana stated that erosion control is the most important. All road-sides are seeded or sodded, and work is now going on to recondition rutted shoulders on some of the older highways. More roadside parks are being planned, he added.

Four years ago, in Massachusetts, roadside - development planning was transferred to the designing engineer, John McManmon reported, since development of the roadsides must start with planning and design. Roadside development, Mr. McManmon said, is not the correction of roadside problems but the creation of a highway properly suited to the right-of-way.

An experimental project in Michigan to determine the best planting for slope stabilization when soils are low in fertility was reported by Edward C. Eckert of that state. Francis Sayers of Missouri stated that his state's new constitution gives the highway department ample authority for freeways, control over right-of-way and roadsides, but that the highway department needs funds to carry out its program. He spoke of the problems of rural electrification and of the extension of urban areas which has wiped out previous roadside work.

Grover Nelson of New York outlined his Department's activities of last year. These include some 12,000 trees removed from the roadsides; development of a simple permit form for utility companies; a voluntary agreement with outdoor advertisers on the subject of billboards; simplification of specifications for roadside contract items, with mulching now included in all specifications; poison-ivy eradication; salvaging of all topsoil removed in the course of highway work; and mechanical stabilization of shoulders.

Wesley Hottenstein of Pennsylvania discussed his program of roadside rests which got under way in 1947. In the

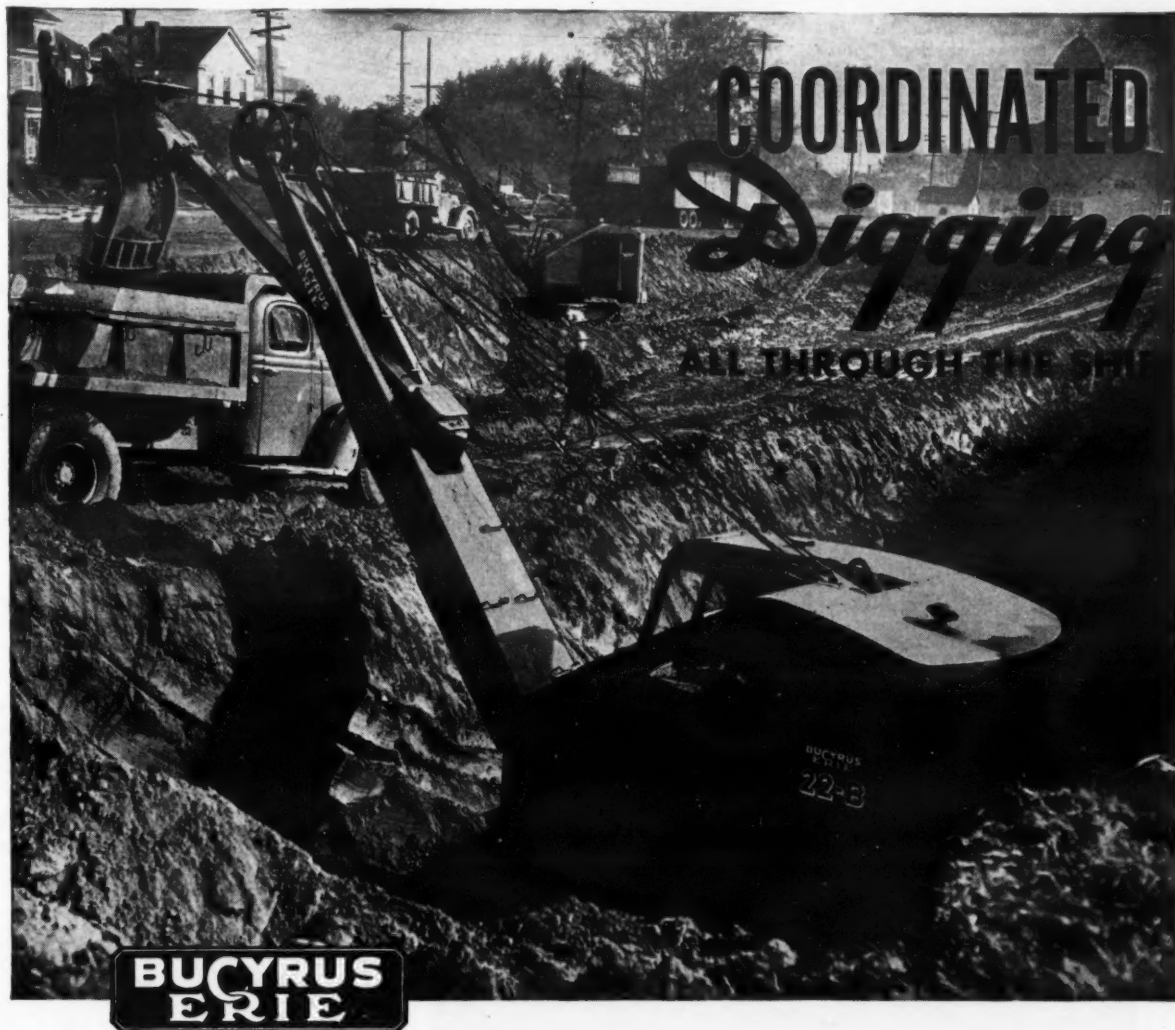
State of Washington, Sidney Walsh reported, roadside work comes under the Construction Division, with full cooperation with the Maintenance Division. As in most other states, erosion control is one of the big problems, and the use of a wire-tied hay mat as a seeding and mulching agent was de-

scribed.

M. A. Mendel of West Virginia discussed his 2,4-D experiments and the special Jeep-mounted spray rig developed in that state for use in its weed-control program. In Wisconsin there are 68 roadside parks, each limited to 5 acres, R. L. Williams reported. Road-

side work there is now included as standard construction items, but the Landscape Division still has its special problems. One of these is the number of historical markers, and Mr. Williams told of the development of a special machine and router which greatly

(Concluded on next page)



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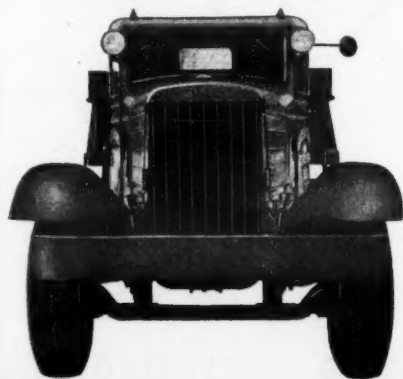
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# Roads and Roadsides Discussed at Meeting

(Continued from preceding page)

speeds up the preparation of signs. North Carolina has been working on the simplification of the utility company permit for line clearance, Frank Brant stated. He also spoke of the need for equipment for roadside operations, and reported on the successful adaptation of farm equipment—wheel tractors, disk harrows, scarifiers, weeders, and terracers—to this work.

Speaking for the Public Roads Administration, George A. Gordon outlined seven vital points in a roadside-development project. They are right-of-way; alignment, as it fits the topography; cross-section types of shoulders, ditches, etc.; conservation; drainage; protection of slopes; and development for future use.

## Inspection Trip

Following the formal sessions of the

Short Course, those attending were the guests of the Ohio Department of Highways on a two-day inspection trip. Although hampered somewhat by inclement weather, the party had an opportunity to visit a number of Ohio's roadside parks, inspect the results of earlier slope-stabilization work, and see some recent mulching projects.

## Trencher in Three Styles

Literature on its trench excavators can be secured by writing to the Badger Machine Co., 570-580 E. Front St., Winona, Minn. These units are made in three models: the Model No. 202; the Model No. 202-B, mounted on a half-track chassis; and the Model No. 203, mounted on a full-track chassis. A separate broadside has been prepared on each of these models.

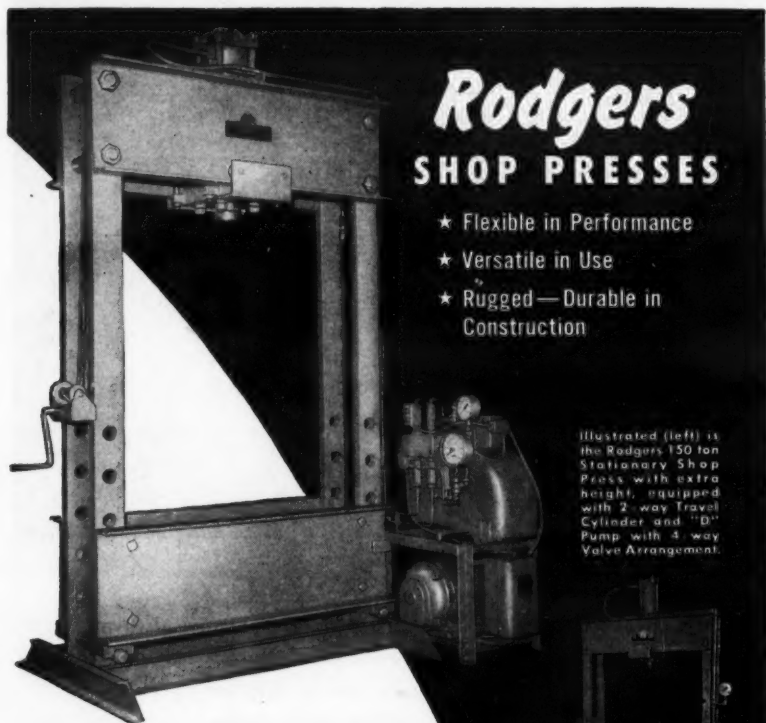
General text matter on one side of the broadside describes the features, construction, and operation of the Badger excavators. It tells about their maneuverability, "roadability", and versatil-

ity. The reverse side of the sheet lists complete specifications and dimensions. These cover the trench-digging unit, the power unit, boom, cross conveyor, frame and chassis, shovels, chain and sprockets, transmission, speeds, etc.

Copies of this literature on the Badger trencher may be obtained from the company. Or use the enclosed Request Card. Circle No. 69.

## "Cat" Parts Depot in Ga.

A parts depot has been established in Atlanta, Ga., by the Caterpillar Tractor Co. It will provide emergency service for users served by Caterpillar distributors in the states of Florida, Georgia, Alabama, and North and South Carolina. It is located at 1122 Chattahoochee Ave., No. W.



## Rodgers SHOP PRESSES

- ★ Flexible in Performance
- ★ Versatile in Use
- ★ Rugged—Durable in Construction

Illustrated (left) is the Rodgers 150-ton Stationary Shop Press with extra height, equipped with 2-way Travel Cylinder and "D" Pump with 4-way Valve Arrangement.

For tough service and maintenance work in pressing, squeezing and forcing, there is a Rodgers Press to meet your requirements. These rugged, flexible shop presses are available in 60, 100, 150 and 200 ton sizes. (300 and 400 ton capacity presses are available upon special order). They all embody the same proved Rodgers design and performance features: Bolster of press is raised and lowered by a hand crank... special alloy steel pins can be adjusted to allow desired opening... cylinders may be had with one way travel or two way travel in ram travel lengths from 6" to 14" as desired—frame construction is of strong, durable rolled steel plate. Power is supplied by self-lubricating hand pumps or power driven pumps.

Save time and labor on your jobs with a Rodgers Shop Press—the exact model that is best suited for your needs. You'll get prompt delivery on any standard model press.

The Rodgers "Sixty"—60-ton Shop Press (shown above) takes care of those miscellaneous jobs that waste so much time and labor. Available with hand operated pumps, or with gear head motor drive, also powered with "D" pump power unit.

Rodgers 100-ton Stationary Shop Press, powered with 4-Speed Hand Operated Hydraulic Pump, also available with "D" pump power unit. Please note that on all presses the cylinder is movable across the entire width of press.



\* Send for this catalog giving complete descriptions, illustrations and specifications of Rodgers Shop Presses. There's no obligation. Write today for your copy.

## Rodgers Hydraulic, Inc.

HYDRAULIC POWER EQUIPMENT  
7415 Walker St., St. Louis Park,  
MINNEAPOLIS 16, MINN.



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It's so easy to wheel heavy loads in Sterling Wheelbarrows, only a minimum of muscle power is required. Sterling's perfectly balanced construction permits 80% of the load to be carried on the wheel... only 20% by the operator. This saving in muscle power increases efficiency... allows more loads to be hauled daily... reduces hauling costs.

Although materials are still scarce, Sterling will make every effort to meet your wheelbarrow requirements just as soon as conditions permit.

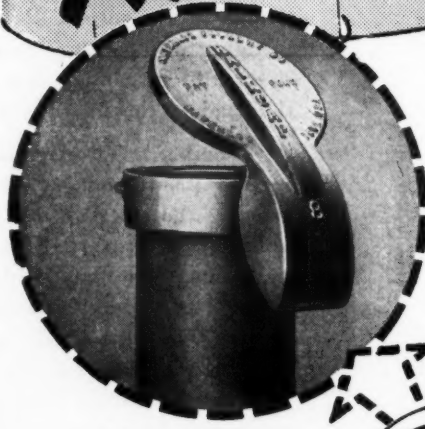
STERLING WHEELBARROW CO., Milwaukee 14, Wis.

## Sterling WHEELBARROWS



Look for this Mark of  
STERLING Quality

A 5166-1/2

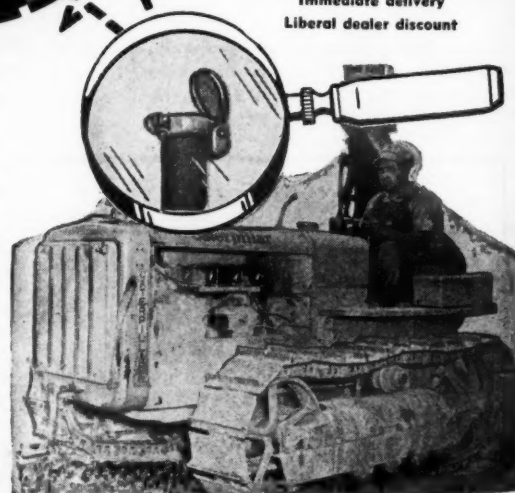


STOPS MOISTURE FROM FALLING INTO TRACTOR EXHAUST... Just slip the "RAINCAP" over the open end of your tractor exhaust, and you eliminate forever the danger of moisture falling into the exhaust, injuring your tractor.

THE CAP THAT DOES NOT FORGET TO CLOSE... Completely automatic—the "RAINCAP" is counter-balanced to open when the tractor starts and close when it stops. Rust proof—made of cast aluminum with bronze bushing—can be installed in two minutes. F.O.B. Waterloo, Iowa. Write Dept. C-1

Immediate delivery  
Liberal dealer discount

No.	O.D. Exhaust	Retail
1	2 1/8"	\$1.90
2	2 3/8"	1.90
3	2 3/4"	1.90
5	1 7/8"	1.90
55	2"	1.90
5x	1 3/4"	1.90
6	1 1/2"	1.90
66	1 3/8"	1.90
7	2 1/2"	1.90
8	3"	2.50
9	3 1/8"	2.50
10	3 1/4"	2.50
11	3 1/2"	2.75
115	3 3/4"	3.00
12	4"	3.00
123	4 1/8"	3.00
125	4 1/4"	3.00
14	4 1/2"	3.00



## WATERLOO FOUNDRY CO., WATERLOO, IOWA

## Realignment Makes For Safer Highway

**Cuts Out Bridge and Sharp Turn; Macadam Base Course For Ohio Road Built With New Vibration Machine**

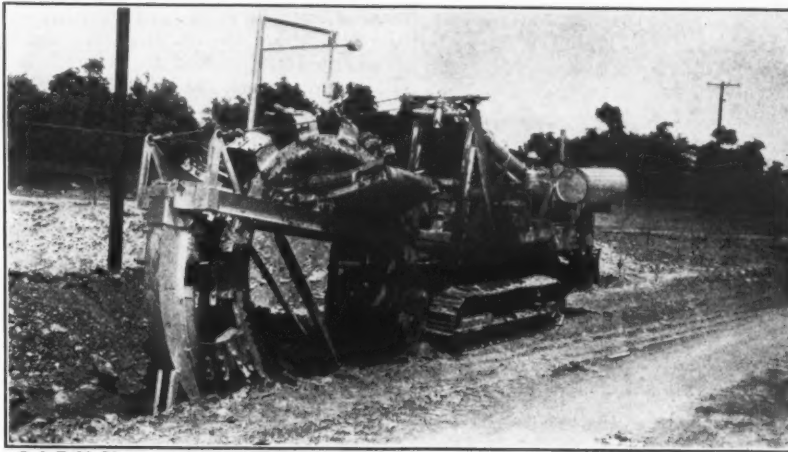
THE reconstruction with improved alignment of a 2.8-mile section of U. S. 42 at Bellpoint, Delaware County, Ohio, should result in a marked decrease of accidents on that busy stretch of the Delaware-London Road. In the past, many smash-ups occurred where the old road, after crossing the Scioto River on a single-lane bridge, made an abrupt right-angle turn and crossed Mill Creek on an equally narrow span. Accidents were especially prone to happen there during the football season when long strings of cars used this road to get to and from the football stadium of Ohio State University at near-by Columbus. Traveling at high speed on a two-lane road, the motorists usually had little control over their cars when they were suddenly confronted with the narrow bridge and turn. As a result many fatal accidents occurred at this location.

The new alignment crosses the Scioto River below its confluence with Mill Creek, so that now a single bridge on a long tangent replaces the two old spans which were practically at right angles to each other. Work on the project, which lies about 6 miles south of Delaware, started in August, 1946, after the Ohio Department of Highways awarded a contract for the job to Visintine & Co. of Columbus, Ohio, on its low bid of \$540,000. The contract included grading, drainage structures, bituminous-surface - treated waterbound - macadam paving 24 feet 6 inches wide, and a continuous steel-deck plate-girder bridge with concrete floor and substructure. The latter has a 28-foot roadway, over a five-span length of 517 feet 6 inches. Steel erection began in November, 1947, and was finished in February, 1948. The entire job is scheduled to be finished July 31, 1948.

### Grading

Extending about the same distance above and below Bellpoint, where the new bridge is located, the project is practically all tangent on its new location. It rejoins the existing black-top 18-foot road at both ends. Flanking the new 24-foot-6-inch pavement on U. S. 42 are 9-foot-9-inch shoulders. Ditches are 15 inches below the edge of the berm; from shoulder to ditch section the inside slope is a curved transition. The backslopes in the cuts are 3 to 1. On fills 10 feet or under, the side slopes are 4 to 1; where the fills are more than 10 feet high, the side slopes are 2 to 1.

Where State Highways 257 and 745 intersect the new location, their approaches were carried back on both sides for a total distance of about ½ mile. The rebuilt portions of the intersecting roads have a 20-foot-6-inch pavement with 7-foot-9-inch shoulders. The slopes are the same as on U. S. 42. Where rock was encountered on any of



C. & E. M. Photo

A Cleveland 110-B trencher digs a 16-inch-wide trench to take a 6-inch tile under-drain installed on the Delaware-London 2.8-mile highway realignment. Depth of the trench averages 3½ feet below the top of the edge of pavement.

the road sections, the backslopes are 1½ to 1.

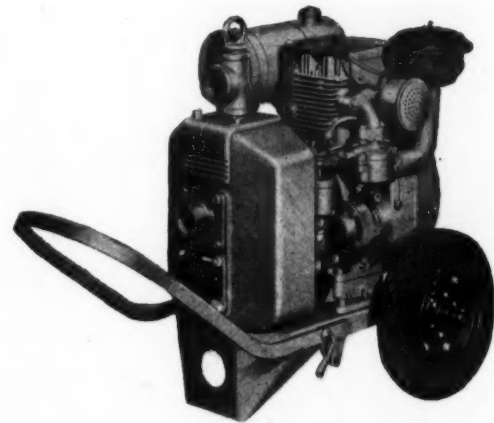
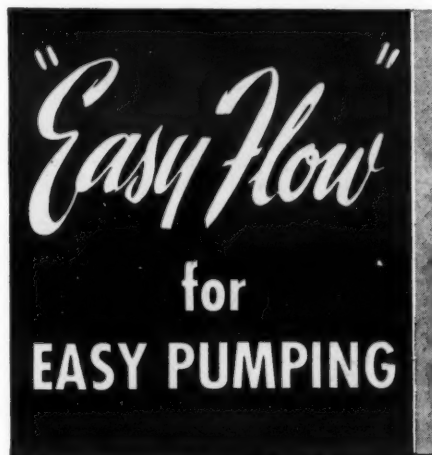
When Visintine & Co. began operations in August, 1946, it concentrated on

the construction of the piers and abutments of the Scioto River bridge for the rest of the working season. It engaged H. W. Holt & Son of Columbus, Ohio, to

move in earth-moving equipment and handle the grading. Excavation for the roadway got under way in November, 1946, but the inclement weather soon halted work and it was not resumed until the following March.

The item for roadway excavation totaled nearly 88,000 cubic yards, while an almost equal amount of dirt was taken from borrow pits to complete the fill embankments. Four roadside borrow pits supplied the necessary material, with the hauls averaging ½ mile. The pits were stripped by four Super C Tournapulls drawing LeTourneau LP Carryalls which held from 12 to 15 yards a load. After the stripping, a Northwest 1½-yard shovel was put in the borrow pits to load four or five trucks which were used to haul the rest of the dirt falling within the borrow-pit quota. The Tournapulls were then shifted to the roadway excavation, where they moved dirt from the cuts to the fills on hauls averaging ¼ mile.

To get the greatest yardage with the  
(Continued on next page)



### DEPENDABILITY PLUS

A Rex "Easy Flow" Pump is dependability itself... not for just one season but for many a year of tough service. Note the rugged press-formed pump body with its glass-smooth steel interior surface. This frictionless surface permits the smoothest flow of water through the pump... increases pump efficiency. There are no rough, pitted surfaces to encourage corrosion and early wear. No priming delays with this design. And note the straight line suction intake. Water takes a slightly downhill flow right to the eye of the impeller with least possible friction loss.



### SUSTAINED EFFICIENCY

Rex "Easy Flow" has a replaceable liner plate and a lifetime seal. But, here's the real secret behind the ability of the Rex "Easy Flow" to give you new pump efficiency for the lifetime of the pump. The exclusive adjustable air peeler is easily adjusted to restore original clearance with the impeller to compensate for wear... assuring the ability in an old pump to give you original priming efficiency at maximum suction lifts.



### LIGHT WEIGHT

With its press-formed body and volute, the Rex "Easy Flow" is approximately 30% lighter than cast styles. It's easy to handle... easy to spot. Yet this pump is the most durable in the field... proved in actual applications. Engine is located over the wheels so you lift only the weight of the pump when wheeling from spot to spot.



### TRANSITS and LEVELS

#### HEADQUARTERS for REPAIRS—any make

We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalog 'CE-44 of Engineering Instruments, Engineering Field Equipment and Drafting Room supplies.

**WARREN-KNIGHT CO.**

Mfrs. of Sterling Transits & Levels  
136 N. 12th St. • Philadelphia, Pa.

For all the facts, see your Rex Distributor or write for your copy of Bulletin No. 47-12. Chain Belt Company. 1666 West Bruce Street, Milwaukee 4, Wis.



## Realignment Makes For Safer Highway

(Continued from preceding page)

Tournapulls, they were helped in loading. A Caterpillar D8 tractor "snatch loaded" them by means of the front hook on the power unit, or a new C2 Tournadozer pushed them from the rear. The Tournadozer was powered by a Buda 180-hp diesel engine and moved on four big Firestone 21.00-25 deep-cleated rubber tires. It was equipped with a 12-foot blade with which it performed the normal functions of a tractor-dozers on the roadway excavation when it was not busy helping to load the Tournapulls.

### Rock Excavation

About 7,000 cubic yards of rock were encountered on the job, most of it in one cut 600 feet long, with a maximum depth of 8 feet. Blast holes were drilled into the rock with a Sullivan wagon drill powered by an Ingersoll-Rand 315-cfm



C. & E. M. Photo  
A Caterpillar D8 tractor "snatch loads" a Super C Tournapull pulling an LP Carryall, during excavation operations for realignment on the Delaware-London Road in Ohio.

air compressor. Drill steel in 6 and 12-foot lengths was used. After the blast the broken-up rock was dug out by a Northwest 1½-yard shovel and loaded into a couple of Tournatrailers. They

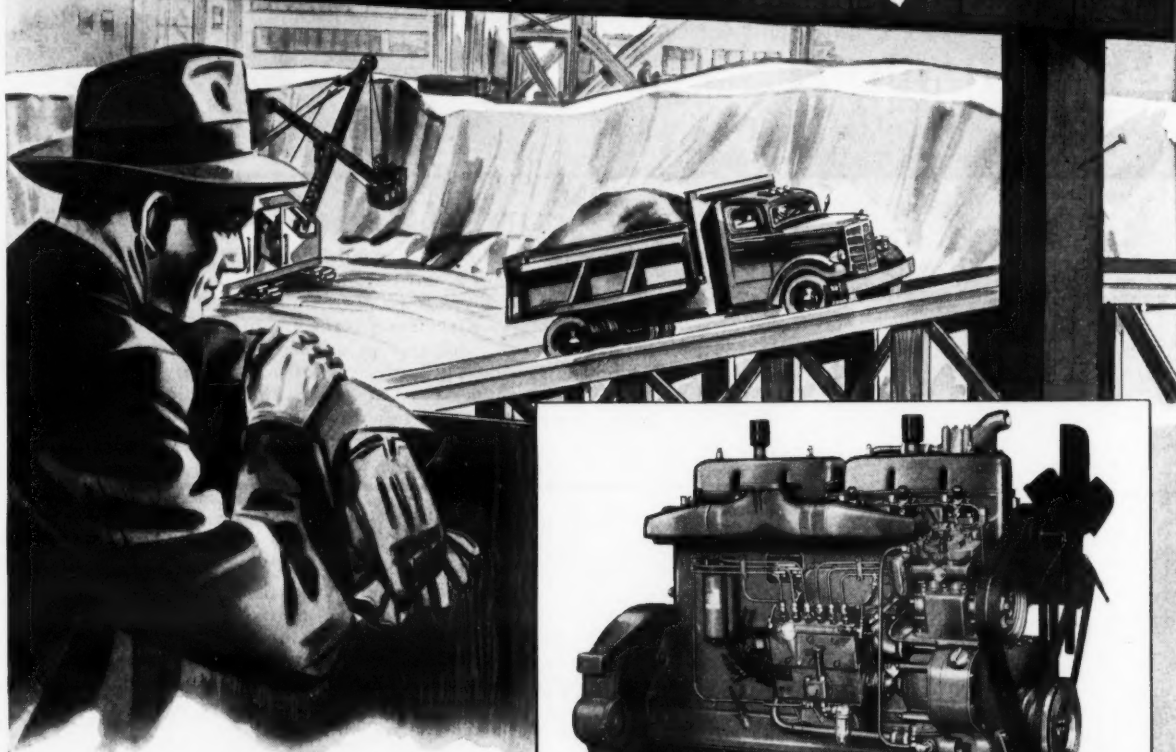
hauled their 12 to 15-yard contents to the fills where the material was end-discharged and spread in 2-foot lifts. The average rock haul was 1,000 feet.

The dirt fills were built up in 8-inch lifts. In addition to the C2 Tournadozer, the material was spread with the help of two crawler-type tractor-dozers—a D8 and a D7. A compaction of 95 per cent maximum density was obtained by means of the equipment running over the lifts, and by a dual-drum sheep-foot roller pulled by a Caterpillar D7 tractor.

Where the old bituminous pavement had to be removed, it was dug up by means of a Slusser-McLean 2-prong ripper pulled by a D7. During the construction operations two-way traffic was maintained at all times on U. S. 42. This necessitated, at one time, the building of a 3,000-foot stretch of temporary road. It was shaped by an Austin-Western motor grader and sprinkled with calcium chloride to stabilize it and lay the dust. A Sterling water-tank truck was

(Continued on next page)

# DON'T WORRY, Mr. Sidewalk Superintendent, *She'll make the grade*



...OUR TRUCKS  
HAVE

## WAUKESHA ENGINES

● Yes, sir, Mr. Sidewalk Superintendent, she made the grade all right. But it's not surprising that you wondered whether the truck could do it.

The truck driver wasn't worried. Not for a moment. He and his truck have been in tougher spots than that. But their Waukesha Engine pulls 'em both out *every time*. "Nuthin' to it," says he. "What those Waukeshas haven't got they don't need. They've got the horsepower—and I've got the horse sense to use it right."

The boss contractor isn't worried either. And he has to think of his trucks in terms of power costs, as well as power. That's why he *specifies* Waukesha Engines. He's buying dependability—with fuel and maintenance economy—when he buys Waukeshas.

Take the Model 148-DK Waukesha Diesel shown. 200 hp. at 2100 r.p.m. Six cylinders, 5¼ in. bore x 6 in. stroke, 779 cu. in. displ. At full output its exhaust is remarkably clean. It has a 7-bearing accurately balanced crankshaft—with crankpins and main bearings hardened to 600 Brinell. Removable wet sleeve cylinders, hardened to 400 Brinell. Chrome silicon alloy intake and exhaust valves; both valve seats are Stellite inserts. Full pressure lubrication. Big capacity oil filter. 24 volt electric starting system. Why not get all the details? Send for Bulletin 1413.

**WAUKESHA MOTOR COMPANY**  
WAUKESHA, WIS.

NEW YORK • TULSA • LOS ANGELES

## SYNTRON

100% Self-Contained  
Gasoline Hammer

## PAVING BREAKERS

Save Money and Time!



**BUST Concrete  
CUT Asphalt**



**DIG Clay and Shale**



**TAMP Backfill**

Low initial cost  
Low maintenance cost  
Low operating cost

Write for illustrated folder

**SYNTRON CO.**  
227 Lexington, Homer City, Pa.

## Selling Used Equipment?

Advertise it in the  
"TRADING POST"

See page 123

## Buying Used Equipment?

Read the  
"TRADING POST"

See page 123

also available for sprinkling the temporary road and the fills in the new road.

With this equipment an average of 5,000 yards of material was moved in a 10-hour day. The shovel and trucks accounted for 1,000 yards, and the four Tournapulls made up the remaining 4,000 yards. Each Tournapull moved an average of 100 yards an hour.

Every night after work, each piece of equipment was lubricated in the field from a truck-mounted Alemite portable service station which had five hose for greases. A 2,000-gallon tank truck supplied the equipment with Standard Oil Co. of Ohio gasoline and diesel fuel. Structural repairs to the equipment were made in the field with welding machines carried on a Dodge Power-Wagon equipped with a winch and A-frame.

The D8 tractor that was used to "snatch load" the Tournapulls was made more efficient for this one function by reversing the ring gear in the rear end. This gave it six speeds in reverse and two speeds forward, which is the reverse of its normal operations. In this way it moved back faster to grab the big rubber-tired earth-movers as soon as they arrived at the cut to get loaded, and turning around was eliminated.

#### Drainage

Through the 1946-47 winter season, some progress was made on installing part of the drainage pipe, and the work continued through 1947. Along the straightaways, 6-inch tile underdrain was placed 18 inches off each edge of pavement and with its flow line averaging 3½ feet below the surface. On curves the tile was installed only on the low side. Trenches for the tile were dug to a width of 16 inches by a Cleveland 110-B trenching machine, and the tile was placed by hand. The backfill consisted of a No. 6 stone. The gradation of this porous material was:

Sieve Size	Per Cent Passing
½-inch	100
¾-inch	90-100
No. 4	10-35
No. 8	0-5

In locations where the tile underdrain crossed the road, the backfill was compacted by Thor and Ingersoll-Rand pneumatic tampers powered by a Jaeger 105-cfm portable air compressor.

The two abutments and four piers of the Scioto River bridge were completed in the autumn of 1946. The piers have footing 3 feet deep in solid rock, and have an average height of 22 feet. The superstructure steel was fabricated and erected by the Mt. Vernon Bridge Co. of Mount Vernon, Ohio. The prime contractor laid the 7½-inch concrete deck for the roadway. The continuous girder bridge has end spans of 90 feet, with three central spans of 112 feet 6 inches.

#### Blanket Course

A blanket course of porous gravel, known as embankment material SS-112, was laid under all the pavement in both cuts and fills to a depth of 12 inches. It extends out 2 feet 2 inches from under the edge of the pavement on each side. In the rock cuts only a 6-inch layer was placed. The material was obtained from one of the borrow pits, and was dug out by a Northwest 25 dragline equipped with a 40-foot boom and a Page ¾-yard bucket. A fleet of 10 trucks, both contractor-owned and rented, averaging 3 yards each, hauled the material to the road. There it was dumped, spread, and compacted by a sheepsfoot roller in 6-inch layers.

The gradation of the blanket course conformed to Grading D of the Ohio Department of Highways supplemental specification No. 112 (11-1-44) which follows:

Sieve Size	Per Cent Passing
3-inch	100
No. 10	50-90
No. 50	0-20

#### New Vibration Machine

On top of the blanket material two 4½-inch courses of waterbound-macadam base were laid on U. S. 42 to a width of 24 feet 6 inches. On the feeder roads the base consisted of two 4-inch courses. Aggregate for the 9 and 8-inch bases was crushed limestone purchased from the Union Stone Co. which had a quarry only 3½ miles from the job. The material was delivered to the job in trucks and laid with three Burch boxes which were pulled by the trucks as they unloaded. The aggregate was an equal mixture of No. 1 and No. 2 stone of the following gradation:

Sieve Size	Per Cent Passing	
	No. 1 Stone	No. 2 Stone
4-inch	100	.....
3½-inch	90-100	.....
3-inch	35-70	100
2½-inch	0-15	90-100
2-inch	.....	35-70
1½-inch	.....	0-15

Two 10-ton 3-wheel rollers, a Bufalo-Springfield and a Galion, rolled the bottom course. It was then covered with stone screenings cast on by hand



C. & E. M. Photo

A C2 Tournadozer moves dirt with its 12-foot blade on the H. W. Holt earth-moving subcontract. It is powered by a Buda 180-hp diesel engine and runs on four Firestone 21.00-25 tires.

shovels from stockpiles that had been spotted along on both shoulders. These fines were vibrated down into the base course by a recently developed piece of equipment which is known as a

#### Vibro-Tamper.

After two or three passes with the Vibro-Tamper, the screenings filled all the chinks and voids in the larger base stone, to form a compact, solid course. The vibrations were also accompanied with a flushing of the surface; the water was supplied by a 1,000-gallon tank truck. The surface was broomed both by a rotary power broom, and a broom carried at the rear of the Vibro-Tamper. The latter broom was 12 feet wide, the full width of the machine, and was made of 6-inch fiber bristles fastened in a wooden frame. The upper of the two 4½-inch courses was constructed in the same way, with each course being rolled by the 10-ton rollers. The gradation of the stone screenings was as follows:

Sieve Size	Per Cent Passing
½-inch	100
¾-inch	90-100
No. 100	10-30

#### Bituminous Surface Treatment

After the base course was completed, (Concluded on next page)

## THE JOB

THE WILKES-BARRE-SCRANTON A



THE MASTER TANDEM produced 150,000 tons of aggregate from rock quarried on the airport site for both base course and asphaltic-concrete surface at the rate of 1400 cu. yd. of highly abrasive stone per day.

THE MODEL "E" set-up near the crushing plant averaged 700 tons of black top mix per day for the 305,700 sq. yd. of flexible base and asphalt surface runways and taxiways.

## THE CONTRACTOR

C. J. LANGENFELDER & SON, INC.  
Baltimore, Maryland

THANKS to the efficiency of Cedarapids equipment and the engineering skill of C. J. Langenfelder & Son, Inc., the people of the two cities, Wilkes-Barre and Scranton, now have a modern three runway airport of which they can well be proud.

Credit for finishing this project on schedule, despite the many difficulties encountered, was due in a large part to the use of Cedarapids Master Tandem crushing and screening plant and a Cedarapids Model "E" bituminous mixing plant.

From coast to coast on all types of construction projects, Cedarapids equipment is used by contractors who know and buy the best in aggregate producing and bituminous mixing equipment. They know that whether they need 50 tons or 250 tons of aggregate per hour or no matter how exacting the specifications for black top... there's a Cedarapids plant to meet their requirements.

When buying aggregate producing or bituminous mixing equipment, buy the best, buy Cedarapids.

#### THE IOWA LINE of Material Handling Equipment Includes:

ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS • STEEL BINS • BUCKET ELEVATORS • VIBRATOR AND REVOLVING SCREENS • FEEDERS • TRAPS • STRAIGHT LINE ROCK AND GRAVEL PLANTS • PORTABLE POWER CONVEYORS • PORTABLE STONE PLANTS • PORTABLE GRAVEL PLANTS • REDUCTION CRUSHERS • BATCH TYPE ASPHALT PLANTS • DRAG SCRAPER TANKS • WASHING PLANTS • TRACTOR-CRUSHER PLANTS • STEEL TRUCKS AND TRAILERS • KUBIT IMPACT BREAKERS



Cedarapids

Built by IOWA

PRODUCT OF IOWA

IOWA MANUFACTURING COMPANY  
Cedar Rapids, Iowa, U. S. A.

## Realignment Makes For Safer Highway

(Continued from preceding page)

it was primed with RT-2 tar at the rate of 0.35 gallon to the square yard. Then the base course was paved with a bituminous surface treatment.

This consisted of an application of MC-4 asphalt, 0.55 to 0.65 gallon to the square yard, which was topped with a combination of 65 pounds of No. 46 stone to the square yard and 9 pounds of No. 6 stone to the square yard. A Gledhill maintainer then passed over the stone, mixing it thoroughly with the bitumen, and afterwards the mat was rolled and shaped to a 2½-inch center crown. The surface was then given a seal coat consisting of an application of MC-5 asphalt, 0.25 gallon to the square yard. This was covered with 16 pounds to the square yard of No. 6 stone. The work was performed by the L. P. Cavett Co. of Cincinnati, Ohio.

The gradation of the No. 6 stone has been given previously. The No. 46 stone used in the mat was graded as follows:

Sieve Size	Per Cent Passing
1-inch	100
¾-inch	95-100
½-inch	65-90
¼-inch	35-65
No. 4	0-15

### Quantities and Personnel

The major items in the \$540,000 highway contract included the following:

Excavation	87,996 cu. yds.
Borrow	86,878 cu. yds.
Tile underdrain; 6-inch	20,578 lin. ft.
Embankment material, SS-112	14,907 cu. yds.
Waterbound-macadam base, coarse aggregate	*10,189 tons
Waterbound-macadam base, screenings	*3,736 tons
Bituminous prime coat, RT-2 tar	13,565 gals.
Bituminous surface treatment, MC-4 asphalt	23,239 gals.
Cover aggregate, No. 6	*343 tons
Bituminous seal coat, MC-5, asphalt	9,684 gals.
Cover aggregate, No. 46	875 tons
Concrete for structures, 20-foot span	874 cu. yds.
Reinforcing steel and under	103,498 lbs.
Reinforced-concrete pipe culvert, 15 to 36-inch	688 lin. ft.
Bridge concrete	1,438 cu. yds.
Bridge reinforcing steel	130,666 lbs.
Structural steel	679,900 lbs.

\*These aggregate quantities are based on aggregate weighing 70 pounds per cubic foot. The material actually used ran from 93 to 100 pounds per cubic foot.

An average force of 30 was employed on the project under the supervision of J. J. Visintine of Visintine & Co. On the grading, Louis Skelton was Superintendent for H. W. Holt & Son. For the Ohio Department of Highways J. L. Robinson was Project Engineer and R. F. Werner was Division Engineer. Homer Anderson is Chief Engineer of Construction.

### Bodies to Haul Concrete

A pamphlet showing many uses for its concrete-hauling equipment has been prepared by the Dumpcrete Division of the Maxon Construction Co., Talbott Bldg., Dayton 2, Ohio. The Dumpcrete body is designed to haul air-entrained concrete without agitation.

The pamphlet shows many illustrations of the bodies in use, and details the advantages claimed by the manufacturer. Action pictures show its use by well-known ready-mix producers.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 72.

### Pavement Protective Coat

Information on its surface seal coat for protecting pavements has been put out in catalog form by Maintenance, Inc., Wooster, Ohio. Known as Jennite J-16, it is said to prevent pavement damage brought about by the action of gasoline, oil, oxidation, freezing and thawing, and similar causes. It is applied by squeegee, surfacing brush, or by spraying, and is said to bond firmly to any clean surface.

The catalog describes the material and shows photographs of several pavements to which it has been applied. It also gives instructions on how to

use the material, names several users, and lists the other products made by this company.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 55.

### Freeze and Thaw Damage May Be \$5,000,000 in Ky.

Over 1,000 miles of Kentucky highways were damaged by freezing and thawing, according to engineers of the Kentucky Department of Highways. It is estimated that it will cost between \$2,000,000 and \$5,000,000 to make the needed repairs. This is said to be the largest repair bill for the state since the spring of 1936, when repairs did run to \$5,000,000.

In many places frost penetrated the subgrades to depths of a foot or more. The periods of quick freezing and equally quick thaws caused damage not only to the substandard roads, but also to the roads built to top standards, it is reported.

### Electric-Equipment Folder

A folder which covers its line of new equipment is being distributed by the Motor Generator Corp., a Hobart Bros. affiliate, Box DM-785, Troy, Ohio. This line consists of electric generating equipment, metal-coloring and finishing equipment, materials-handling equipment, battery chargers, electro-power units, buffers and grinders, air com-

pressors, and others.

The folder illustrates and describes the complete line of MGC products. For each item, there is an illustration, a short description of what it is, and a list of uses for which it is recommended. In all, 25 pieces of equipment are so described.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 59.

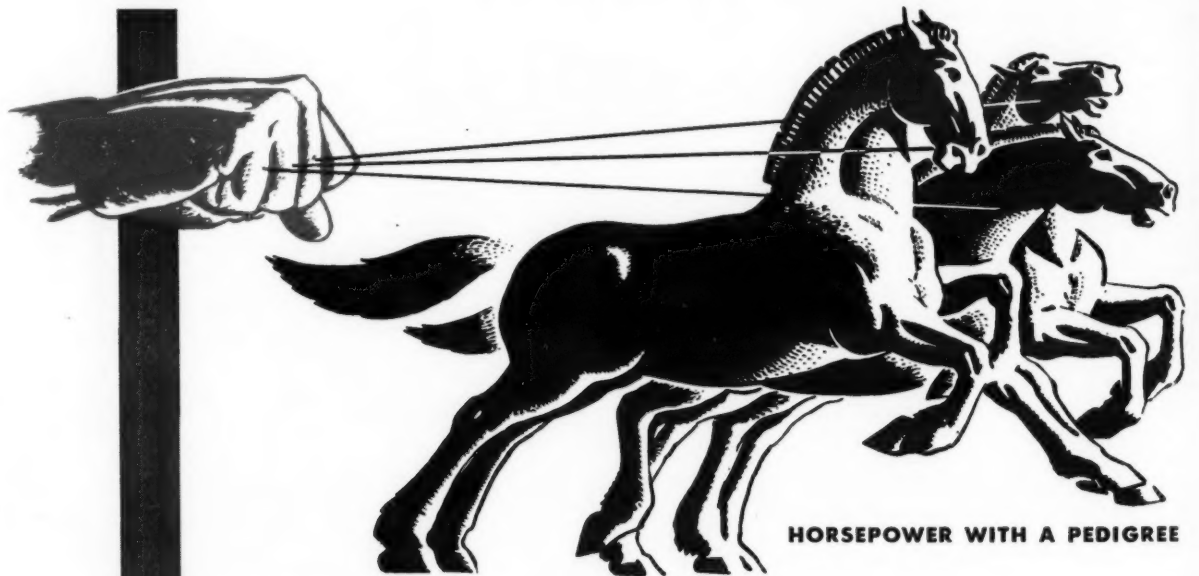
## DECALS

IDENTIFY YOUR EQUIPMENT WITH COLORFUL DECALS, THE MODERN METHOD OF SIGN LETTERING EQUIPMENT.

FOR INFORMATION AND PRICES DEPT. A

## CONTINENTAL DECALCOMANIA CO.

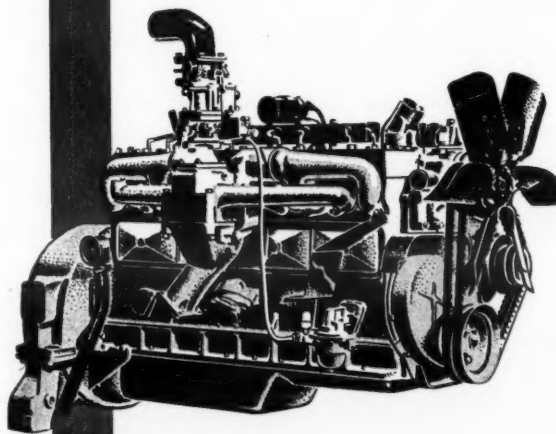
572-4 DIVISION AVE., S. GRAND RAPIDS, MICHIGAN



HORSEPOWER WITH A PEDIGREE

## FOR A BETTER DAY'S WORK

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# CHRYSLER

## INDUSTRIAL ENGINES

INDUSTRIAL ENGINE DIVISION, CHRYSLER CORP., 12200 E. JEFFERSON, DETROIT 31, MICH.



## Big Breakwater Job Enlarges Ore Harbor

(Continued from page 2)

hostilities the shipyard turned out a new 580-cubic-yard all-steel dump scow. It is the latest thing of its kind along the lakes and is a good companion for the dipper dredge.

Business negotiations with the Duluth Missabe & Iron Range Railroad at the time of bid resulted in Zenith's exclusive use of a commercial dock near the big ore docks of Two Harbor's waterfront. The Railroad had the dock re-braced and re-decked, and three sets of railroad tracks were laid to carry carloads of breakwater stone. The construction scheme and agreements at this time called for the use of the D.M.&I.R. railroad for all stone transportation

from the quarry to Two Harbors. The Railroad also set aside 125 railroad flat-cars for use, and installed at the Zenith Dredge Co.'s expense 6 x 12-inch timbers laid narrow side up all around the edges. To prevent damage to the car decks, Cap Carlson hit on the idea of a 5-inch layer of crushed gravel, laid inside the timber coaming; this plan has been followed.

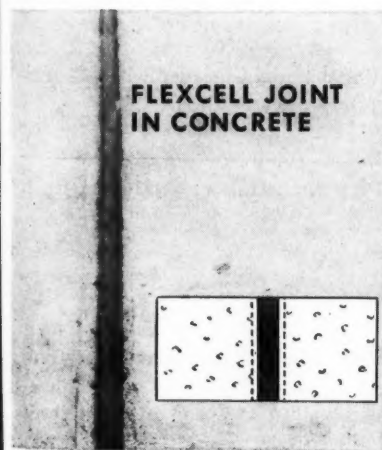
A commercial aggregate-producing plant had been purchased by Zenith some years before, out near Gary, Minn., about 12 miles from downtown Duluth. The quarry there contains some of the hardest, most indestructible gabbro rock anywhere along the lakes. Zenith figured that the set-up could stand the daily drain of 2,000 tons to feed the crusher and still produce plenty of stone for the breakwater.

(Continued on next page)



*C. V. E. M. Photos*  
Zenith's quarry for its harbor-development contract for the Corps of Engineers contains some of the hardest gabbro rock along the Great Lakes. Drill Boss T. E. Hartikka watches the shovels and cranes working far below him in the quarry (photo at left), while the camera man hustles down for a close-up of a Lima 1201 shovel loading rock.

## LEADING ENGINEERS SPECIFY



### CHECK THESE POINTS OF FLEXCELL SUPERIORITY

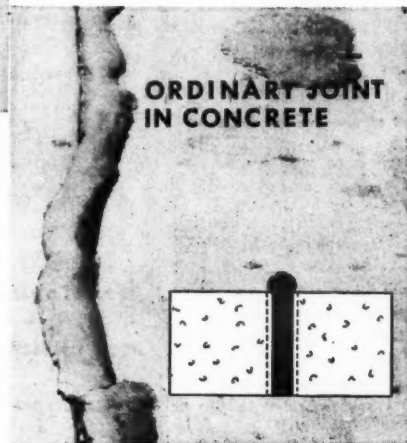
- ✓ Will not extrude under compression by adjacent concrete slabs—millions of tiny air cells permit compression without displacement.
- ✓ Resilient and re-expands when released from compression because of its wiry spring-like cane fibres. Cellular structure permits proper uniform compression.
- ✓ Durability proved by many years of actual use.
- ✓ Retains original shape while being installed because of pre-moulded Celotex cane fibre board core. May be stored indefinitely. Light weight. Easily cut with hand saw.
- ✓ Adheres firmly to concrete. Provides neat finished joint.
- ✓ Made of Celotex cane fibre board integrally treated during manufacture, to make it toxic to fungi and termite attack. Additionally protected against moisture by FLEXCELL PROCESS which impregnates the fibres with durable asphaltic compound.

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## Big Breakwater Job Enlarges Ore Harbor

(Continued from preceding page)

Considerable new railroad track was necessary to get the railroad cars from the main line up onto the quarry floor, and this spur work was done at Zenith's expense. This preliminary work, involving a heavy investment, was all necessary before work on any of the contract pay items could be pushed.

The contract was let early in July, 1947, and is expected to last about three years from the date of award.

### Dipper Dredge Starts Job

On July 6 the dipper dredge No. 27 arrived to start the dredging part of the contract. Equipped with a 4-cubic-yard dipper, it was set in on 20-foot-wide cuts to skim off as much of the easy digging as possible with the over-size bucket.

No. 27 is set on a steel-truss-braced wood hull 95 x 35 x 11 feet. She has two all-steel forward anchor spuds 24 inches square x 55 feet long, with pointed ends and cable up-and-down drive. Her stern walking spud is 18 x 24 inches, and 65 feet long. In ordinary digging this spud will easily let No. 27 move ahead about 8 feet per move.

Her power plant consists of a 100-hp fire-tube horizontal locomotive-type boiler, fired by coal. Using about 3 tons of coal per 10-hour shift, this boiler furnishes steam to the main hoist, the swing engine, forward and aft spud engines, light plants, a bilge pump, and two boiler-feed pumps. This is enough of a load on the boiler to require three cleanings of the fire a shift when No. 27 sticks her dipper down in hard digging.

Shore ranges which mark the dipper-dredge cuts were laid out 40 feet apart, and so designed that the dredge could line herself up with either side of the hull on the target line. The hull is just a bit too wide to coincide exactly, but a line of sight just inside the forward spuds gives an accurate cut.

The dredge started off in water deep enough to float the dump scows, and worked towards the starboard, taking one cut after another. This left enough deep water on the port side of the dredge to take care of any tug and dump-scow maneuvering. A smaller wood dump scow, holding about 280 cubic yards, was also brought in to use with No. 27.

The new all-steel dump scow, now being used with the dipper dredge, will be used later on to dump some of the core rock of the breakwater. The sloping sides of the dump pockets have been lined with hard maple timbers to take the punishment which the abrasive rock will give.

The drive shaft for closing the dump-scow doors is driven from an enclosed engine house by a Minneapolis-Moline gasoline engine through a set of Michigan Tool cone drive gears. The dogs which engage the teeth on each dump-gate drive can be knocked out laterally by a sledge-hammer blow. The dogs are also balanced on steel pins, so they never drop down to tear up drive chains.

The dipper dredge put out some impressive yardage figures while she had the 4-yard bucket on soft digging. Yardages ran as great as 1,600 to 2,000 in the two 8-hour shifts.

This comparatively soft digging lasted for only a few weeks, however, before the dredging honeymoon was over. From there on it became a tough, bruising battle. When the job was visited by CONTRACTORS AND ENGINEERS MONTHLY's Western Editor, the dredge had changed to a 2½-cubic-yard dipper; was deep in a cut of cemented clay, hardpan, and conglomerate; had parted two 1¼-inch plow-steel hoist ropes; and was getting only about 900 cubic yards in the 16-hour working period.

The difficulty in digging this hard



C. & E. M. Photos  
"Why do you want my picture?" John W. Hayden, above, cook on the dipper dredge No. 27, doesn't realize that he's one of the most important members of the crew. Another is Sam Halberg (right), Second Engineer, shown here at the control levers.



material, aside from its very hardness, is that the dipper tends to "run" towards any groove previously cut in the bank. Then too, some of the cemented

rocks are gigantic. No. 27 picked up a 30-ton rock one morning; had to dig a 40-foot hole to bury another below project depth. While old-time opera-

tors can dig more or less accurately just by the feel of the machine, they cannot see what goes on underneath. And frequently the dipper, straining hard on a rock ledge, will slip off, tearing steel teeth right off the lip of the bucket. Some of the rocks they bring up are so oversized, and so embedded in the dipper bail, that special back-haul cables have to be run out from the deck hoists to get them off.

As each pocket of the dump scow is filled, cables from the deck winch move the scows up and down along the side of the dredge. When a scow is filled, a whistle blast signals the 200-hp tug Chattanooga to take the load out over deep water. There is 180 feet of water only 1½ miles offshore at Two Harbors. Loaded scows are towed by the big tug out to that point, the dogs are knocked loose, and the dense, heavy material drops through with a whooshing suction and a backwash of spray as violent as an explosion.

Dipper-dredge work is being carried (Continued on next page)

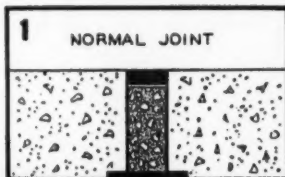


## KORK-PAK does a better job!

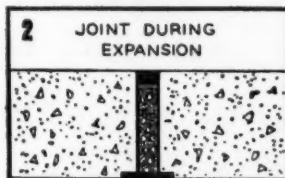
"Why **Kork-Pak**?" Because the improved **Kork-Pak** gives you 5 definite advantages:

1. **Kork-Pak is more fully resilient.** It has a greater recovery—between 80% and 90% as against 70% for ordinary fibre joints. The more fully the space below the seal is kept filled during contraction, the less danger exists of penetration of the seal by dirt, stones and other non-compressible material, which might cause a blow-up when expansion takes place.

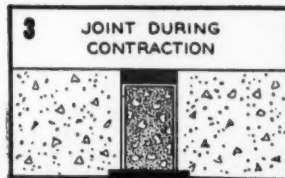
Contractors will find that less sealing material is needed when **Kork-Pak** is used because it keeps the joint more nearly filled.



KORK-PAK fills the joint fully at the time of insertion, and rests at the bottom on the premolded strip of Para-Plastic called Baseal. It is covered at the top with hot poured Para-Plastic.



During compression, as in periods of maximum concrete expansion, Kork-Pak will not extrude. It takes the full compression exerted in the normal joint and then recovers more than 80%.



During contraction, the higher resiliency of Kork-Pak permits a more complete filling of the joint than ordinary fibre materials, thus preventing large openings between it and the concrete which could become filled with non-resilient materials and cause a blow-up.

2. **Kork-Pak handles readily without breaking.**

3. **Kork-Pak absorbs less water**—only 8% by volume as against 15% for ordinary fibres.

4. **Kork-Pak is non-extruding.**

5. **Kork-Pak has the desirable characteristics of the more expensive joints combined with low cost.**



# SERVICISED PRODUCTS CORP.

6051 West 65th Street,

Chicago 38, Ill.

to depths of 26 and 28 feet below low-water datum, plus 2 feet of allowable overdepth in either case. The dipper dredge carries a crew of 23 men, including operators, deckhands, engine-room men, and cook John W. Hayden, who serves excellent food to the hard-working crew. Fred Wright and Sam Halberg are the two operator-captains who keep the No. 27 hard at work. Each of the men has a first-class steam engineer's license.

#### First Toe Stone Goes In

At the same time the dipper dredge was working, the first actual construction on the breakwater also got under way. First work consisted of setting the huge toe stones at the outer limits of the rubble mound. When these heavy stones have been set carefully in place, the core rock will then be dumped from the 580-cubic-yard steel scow now used with the dipper dredge. This operation has been timed for completion so the scow can be moved to the breakwater at about the same time dredging is fairly well completed.



C. & E. M. Photo  
Here are Quarry Superintendent T. M. Berg (left) and John "Cap" Carlson (center) of the Zenith Dredge Co., with E. B. Gustafson of the Corps of Engineers, who is in immediate charge of field administration of the contract.

ly well completed.

The big stones are being unloaded by the derrick boat Faith which places

them in the structure. When it has a deckload of stones, a tug takes it out to location where the stones are placed.

Ranges and buoy lines mark the toe of the breakwater slope.

Smaller core rock is being transported on the railroad cars in 8-ton-capacity dump skips, made of  $\frac{3}{8}$ -inch steel-plate stock and braced with 4 x 4-inch angle iron. The inner stone is being placed as a bulwark to contain the cover stone at the toe.

A subcontract has been awarded to J. D. Harrold of Duluth for the construction of the timber cribs. But it will be well into the '48 construction season before this really gets under way to the point where the cribs can be placed.

#### Quarry in Full Operation

One of the most important parts of the big project is the drilling, blasting, and loading of rock in the big quarry west of Duluth. There Zenith has set up the latest word in rock-producing machines to cope with the tough schedule on the breakwater.

The rock is Duluth gabbro, a hard stone of greenish-black hue, and one of the toughest formations on the North American continent. Quarry work has now opened the site up to where a face 1,000 feet long and 150 feet high is exposed. The dark rock lies in place in huge solid blocks, marred here and there by cracks where cleavage planes have faulted the once solid formation.

If Zenith were to shoot a row of blast-hole-drill holes 40 feet back from this face along its length, 500,000 tons of rock would come rattling down. But this is not a practical way to go about it, for the daily needs of the rock crusher have to be considered. Therefore the work is correlated as between the breakwater and the crusher plant. One blast hole is drilled and shot at a time, producing from 40,000 to 60,000 tons in various sizes from fines to 20-ton chunks.

A new Bucyrus-Erie 29-T blast-hole drill is being used high up above the quarry floor to drill these holes. This machine uses a 9-inch-diameter drill bit at the end of a 3,600-pound tool string. The rock is so tough that from 2 to 3 feet per hour is considered excellent, and drill bits beat themselves dull in about 1½ hours. These big bits are then sharpened by a Bucyrus-Erie bit-dressing machine down in the blacksmith shop, and tempered in cold salt-water solution.

Drill holes are put down at least 12 and sometimes as much as 20 feet below the grade of the quarry floor to insure a thorough breakout all along the toe. The holes are going down 40 feet back from the face of the rock, and an average of 40 feet apart. However, each hole is loaded and shot when drilling is finished.

Du Pont 60 per cent gelatin powder, in cartridges 7½ x 24 inches, is used. This fast explosive gives enough jar to fracture a high per cent of the rock fine enough to go to the primary crushers, and the per cent of oversize checks out about right for the breakwater. However, according to Quarry Superintendent Thor Berg, if the crusher output is curtailed and breakwater operations speed up it will probably be necessary to switch to a slower-speed granular powder. A 170-foot hole shot recently took 2 tons of the stick powder, but when the shot was pulled with Primacord detonating fuse nearly 60,000 tons of rock rolled down to the quarry floor.

Some secondary drilling and blasting is necessary to reduce a few of the greatly oversized rocks. A Gardner-Denver 315-cfm compressor with several Ingersoll-Rand JB-4 Jackhammers is used for that work. The quarry also has an Ingersoll-Rand FM-2 wagon drill available to round out drilling in any spot not accessible to the bigger machine.

Breakwater rock is loaded out by chain baskets on a cable bridle, handled by a new Industrial Brownhoist railroad crane. This machine easily picks

(Concluded on next page)

# BETTER JOINT PROTECTION

## with Serviced Para-Plastic

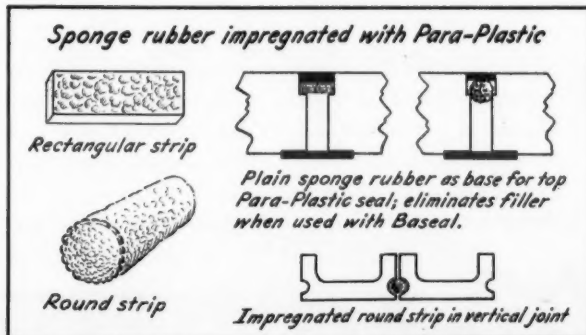
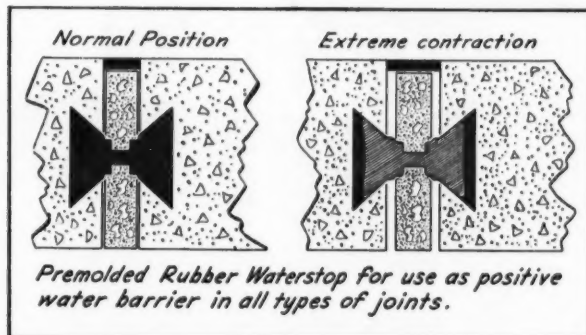
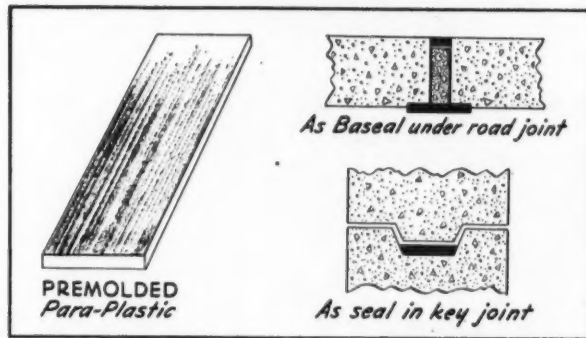
(Reg. U. S. Patent Office)

Para-Plastic enables you to meet satisfactorily practically every condition ordinarily encountered in connection with water seal, vapor seal, expansion and contraction in heavy construction—road paving, bridges, dams, reservoirs, spillways, tunnels, sanitary works, airport paving, underground electric terminals.

Para-Plastic is a formula containing rubber and other chemicals, with its own particular and distinctive characteristics. It was created specifically because practical construction experience has shown that ordinary asphaltic or tar sealing compounds may fail during certain phases of the expansion and contraction cycles. This experience also clearly showed what characteristics a material must have in order to form a complete water seal all year around, at all temperatures. Para-Plastic has those characteristics to an exceptional degree.

It is a rubbery, resilient, adhesive plastic which will adhere to steel, metal, wood, tile, glass, concrete and all forms of masonry. It is cohesive, as well as adhesive, and is therefore self-healing. It will not become brittle or hard at low temperatures from zero to 140° F, and in this range will maintain a positive bond, a continuous seal. The use of Para-Plastic establishes a new and better art in the protection of expansion and contraction joints against water infiltration.

Write for literature and complete details on the other Serviced products which have been standard in this field since 1920.



# SERVICISED PRODUCTS CORP.

6051 West 65th Street, Chicago 38, Ill.



C. & E. M. Photo  
To check depth, Inspector George "Push" Lewis manipulates a sounding reel at the back of the dump scow which Zenith used along with its dipper dredge.

### Big Breakwater Job Enlarges Ore Harbor

(Continued from preceding page)

up stones as heavy as 35 tons, and loads them out on the flatcars.

Most of the core rock put out last year was loaded in the 150 steel skips now in use. As 200 more of these containers are being made up by Zenith Dredge Co. welders at their shop, eventually about 350 of these will be in use. The smaller core rock is dipped out by a Lima 1201 shovel with a  $3\frac{1}{2}$ -cubic-yard PMCO dipper, and this machine also keeps two 15-ton Euclids and an International truck busy hauling fines over to the Allis-Chalmers gyratory crushers at the plant.

Loaded trains are handled from the quarry down to the main line of the D.M.&I.R. Railroad by a Porter 50-ton locomotive. Since a part of the railroad leading in to the quarry is on a 4 per cent grade, a great deal of care must be used not to overload the locomotive when it takes a train out to the main line.

With the quarry working close to capacity last season, plans are under way to speed the rock handling on the breakwater this year. The working season is short at Two Harbors—only about 6½ months—and solid ice halted all operations before January 1.

#### Personnel

The big project is being administered under the general supervision of Colonel Heston R. Cole, Duluth District Engineer of the Corps of Engineers. E. R. Gustafson, Chief of his construction section, is in immediate charge of field administration of the contract.

Actual construction work is under the supervision of company President Don MacDonald, with John Carlson active on the supervision. Einer Nelson is Chief Engineer on the job and Melvin Hotvedt is the Marine Superintendent in charge of the project.

### Small Water Pumps

A light-duty water pump is now in production at the plant of the Edwards Co. of Sanford, N. C. It is available in two sizes—275 and 375 gallons per hour. According to the manufacturer, these pumps are not damaged by sand or other abrasives in water. A patented rubber diaphragm is said to prevent water from reaching the bearings, and to allow for simplified internal construction, which does away with crossheads, guides, packing glands, and other parts. Ball bearings are life-time lubricated and the pump is said to require no oiling.

Power is obtained by  $\frac{1}{8}$  and  $\frac{1}{4}$ -hp electric capacitor motors equipped with overload protection cutouts. The manufacturer furnishes an automatic pressure switch designed to provide service

from 20 to 40 psi; and a high-pressure model is available for a range of from 40 to 60 psi. Also available is a gasoline-engine-driven pump which has a capacity of 400 gph. It is designed for use with pressure-tank service of 60 psi.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 7.

### Marion Sales Mgr. in SW

Marion Power Shovel Co. announces the appointment of a new District Sales Manager for the territory of Texas, New Mexico, Oklahoma, and part of Arkansas. This territory is now supervised by R. W. "Bob" Head from his headquarters at 4534 Travis St., Dallas 5, Texas.

### Backstop Prevents Machinery Back-Run

A backstop designed to prevent reverse rotation on conveyor drives, winches, and other applications is announced by The Falk Corp., 3001 W. Canal St., Milwaukee 8, Wis. The manufacturer explains that the gripping action of the Falk backstop takes place at the precise moment that forward rotation ceases.

In operation, centrifugal force throws out the weighted part of the pawl, thereby preventing contact with the housing bore. Upon deceleration, the heavier mass of the pawl falls back when released from centrifugal force. When rotation has ceased, gravity will force one or two of the pawls to press

against the housing bore. The remainder of the pawls are so set up that they are unaffected by gravity, and are forced into engagement by springs so that all four pawls are brought to bear on the housing bore.

The Falk backstop is built in three sizes to accommodate a wide range of shaft diameters and torque requirements. Size No. 10 has a maximum speed of 3,600 rpm and a torque rating of 541 foot-pounds. Model No. 20 has a maximum speed of 2,400 rpm and a torque rating of 1,155 foot-pounds. And the Model No. 60 has a maximum speed of 1,800 rpm and a torque rating of 3,360 foot-pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 96.

# YOU can't afford to miss the Road Show!

1948

Mark your calendar!  
Make your plans!

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100% BETTER ROAD SHOW  
AMERICAN ROAD BUILDERS ASSOCIATION  
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No matter how busy you are... it will pay you to drop everything — July 16 to 24 — and ride, drive, or fly to the big 1948 Road Show in Chicago.

Here — in one place, at one time — you'll have an opportunity to see and compare all the latest developments in roadbuilding equipment and methods. You'll also have a chance to pick up vital information on planning, organization and costs... facts you must have to keep pace with changing conditions in the construction industry. But remember, this is the first Road Show in 8 years... everybody's going to be there... so don't put it off! Make your plans and reservations NOW!

## 45<sup>th</sup> ANNUAL CONVENTION and INTERNATIONAL ROAD SHOW

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#### QUICK FACTS

- A 9-day opportunity to "catch up" on all that's new in roadbuilding.
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- Down-to-earth discussions with world-famous roadbuilding authorities.
- A chance to meet old friends and make new contacts.

## Convention Calendar

### June 21-23—County Officials Meeting

Annual conference, National Association of County Officials, Hotel George Washington, Jacksonville 2, Fla. NACO Housing Committee, Tourist and Convention Bureau, Jacksonville, Fla.

### June 21-25—ASTM Meeting

Annual meeting and exhibit of testing apparatus and related equipment, American Society for Testing Materials, Book-Cadillac Hotel, Detroit, Mich. C. L. Warwick, Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

### July 12-24—ARBA Road Show

Road show, American Road Builders' Association, Soldier Field, Chicago, Ill. Charles M. Upham, Engineer-Director, International Bldg., Washington 4, D. C.

### July 21-23—ASCE Meeting

Summer convention, American Society of Civil Engineers, Olympic Hotel, Seattle, Wash. Col. William N. Carey, Executive Secretary, 33 W. 39th St., New York 18, N. Y.

## Monoxide Detector

A carbon-monoxide detector for use in tunnel construction and other places which have a potential carbon-monoxide hazard has been brought out by the United States Safety Service Co., 1215 McGee St., Kansas City 6, Mo. Known as the Saf-Co-Meter, it is said to detect and estimate the presence of less than one part of carbon-monoxide in 500,000,000 parts of air.

Heart of the detector is the indicator tube, in which there is a special indicator gel. The presence of CO will cause this gel to discolor in proportion to the amount of monoxide in the air. This discoloration is checked against a color chart, which tells how much monoxide is present in the air, and what its effects will be if exposure to this amount is continued for any length of time. In operation, air is drawn through the tube by means of a rubber aspirator bulb equipped with an air-flow control valve. It takes less than a minute to make a test, the company says.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 6.

## Spreader for Road Work

Literature describing the features and uses of the Butler D5 sander can be obtained from Butler Industries, Inc., 6450 LeGrand Ave., Detroit, Mich. The unit can be used to spread sand, salt, gravel, chlorides, cinders, or other abrasives, wet or dry. It is powered by a 1½ to 2-hp air-cooled gasoline engine. Feature of this sander is its vibrating hopper.

A broadside has been prepared on this piece of equipment which shows a picture of it, lists its specifications, and describes several advantages claimed for it.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 81.

## Open-Gear Lubricant

An open-gear lubricant is announced by the D-A Lubricant Co., Inc., 1311 W. 29th St., Indianapolis, Ind. It is said to maintain a high degree of efficiency over a wide range of temperatures. According to the manufacturer, the D-A open-gear lubricant will not solidify or become brittle at temperatures below zero, nor will it thin out and lose body at high temperatures.

Base for the lubricant is a Pennsylvania crude oil. It can be applied without heating, and if done correctly, will not become fluid and fly off the gears during operation, the manufacturer explains. Its melting point is listed at over 300 degrees F. It is made in both summer and winter grades.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 29.

## Hauling Unit Described

A 6-page folder on its new heavy-duty self-powered hauling unit is being distributed by The Tournalayer Division of R. G. LeTourneau, Inc., Longview, Texas. The Tournalayer is mounted on large rubber tires, and is manufactured in models with loaded capacities which range from 20 to 100 tons.

Folder RT-149 tells about the four basic models and pictures the unit in use on various hauling jobs. Pictures also illustrate features claimed for the machine, such as the positive-power steering, the ability to make sharp turns, the high degree of flotation and traction, and others. Also described are the variations in the style of the bed, which increase the types of jobs for

which the Tournalayer is suited.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 64.

## Coating for Pipes

A new protective coating for pipes has been developed by National Petroleum Sales, Inc., 315 W. 9th St., Los Angeles, Calif. Duratex is said to resist electrolysis and corrosion, and to reduce damage caused by shock impact when pipe trench is backfilled.

Because of its ductility, Duratex will withstand earth shock or movement,

the manufacturer explains, and because of its stability, it will not slump or creep due to earth pressures. Its flash and fire point is in excess of 500 degrees F. It is non-toxic, and it is claimed that it will not settle out or coke up after repeated re-heating or re-tempering. Agitation is not required in the heating kettle. Alkalis and soil acids have no appreciable effect on Duratex, and it has a high bonding affinity for metal or concrete, the manufacturer states.

Further information on Duratex pipe coating may be secured from the company, or by using the enclosed Request Card. Circle No. 48.



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**"Van Dorn"**  
(DIV. OF BLACK & DECKER MFG. CO.)

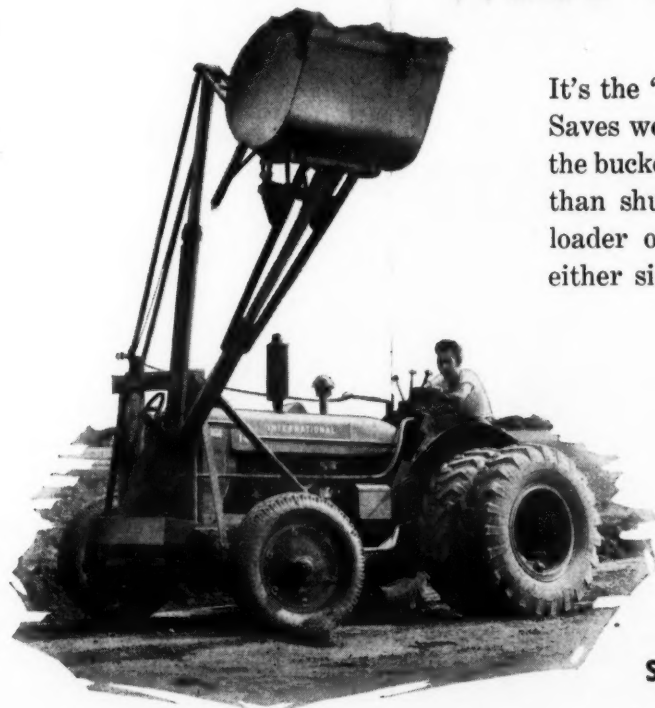
PORTABLE ELECTRIC TOOLS

## Adds RADIAL Features to PORTABLE Electric Saws!

A new Van Dorn Quick-Saw Arm doubles the usefulness of your Portable Electric Saws! Helps you do radial as well as portable sawing with the same tool. Speeds up cross-cutting, bevel cutting, mitre cutting, ripping, plunge-cutting—with greater accuracy—with less operator fatigue. All three Van Dorn Electric Quick-Saw models (and most other portable electric saws) fit into the adjustable carriage in a jiffy. Clamps to saw horse or column. Easily adjusted. Ask your nearby Van Dorn Distributor for details. Write for free catalog to: The Van Dorn Electric Tool Co., 787 Joppa Road, Towson 4, Maryland.

\*Trade Mark Reg. U. S. Pat. Off.

## WAY UP AND OVER



It's the "and over" part that interests you, too. Saves wear and tear on equipment by swinging the bucket load to the waiting dump truck rather than shuttling back and forth with either the loader or the truck, or both. Swings 90° to either side for dumping.

### It's a SUPERIOR Loader

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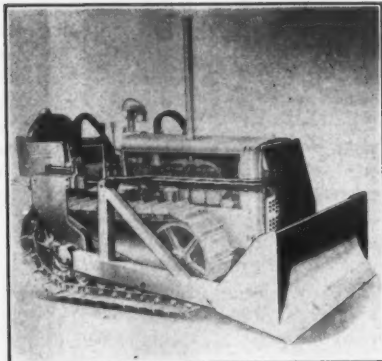


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Caterpillar's No. 2S hydraulic bulldozer shown here—a straight-blade model—is designed for use with the Caterpillar D2 tractor. So is the new angling-blade Model No. 2A.

## Two New Bulldozers For Small Tractors

Hydraulically controlled bulldozers matched in design and capacity with its D2 crawler tractors are announced by the Caterpillar Tractor Co., Peoria 8, Ill. They are made in two models—the No. 2A, angling-blade, and the No. 2S, straight-blade. The company recommends them for land clearing and leveling, minor road building and maintenance, snow removal, soil conservation, and other light bulldozing tasks.

The Caterpillar hydraulic system includes such features as a front-mounted positive-action balanced-vane type of pump, integral with tank and operating valves; a manually operated control valve, with raise, lower, and hold positions; carburized pins for connecting pistons, cranks, and push arms; high-pressure reinforced hydraulic hose; and seamless steel lines which are coupled to the hydraulic hose in order to direct the flow of oil from the hydraulic pump housing to the power cylinders.

The No. 2A bulldozer has a blade length of 80 inches for the 40-inch-gage D2 tractor, and 97½ inches for the 50-

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The No. 2S bulldozer has a blade length of 68 inches for the 40-inch-gage tractor and 80 inches for the 50-inch gage. It has a maximum lift of 25 inches and a drop of 10 inches below the ground.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 22.

## Rock-Drill Dust Collector

A folder on its portable gasoline-engine-driven dust collectors is being distributed by James H. Markley, 80 Snyder Road, Ramsey, N. J. The collectors are made in two models and are designed for use with rock drills and jackhammers. The folder gives complete details on these units, and lists many of the uses for which they are recommended by the manufacturer.

Discussed in detail are the specifications for both the Model No. 1 and the Model No. 4; the slip-on hood and manifolds; and the power unit. The folder points out the principal features of construction, indicating how these are designed to simplify and improve the operation of the Markley dust collectors.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 51

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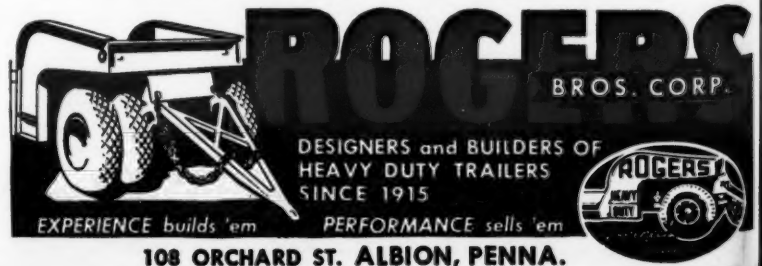
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A bracket designed to help build scaffolding quickly and safely is made by the Du-All Scaffold Bracket Co., 44 E. Broad St., Columbus 15, Ohio. It can be used with 2 x 4's for trestles and 2 x 6 to 2 x 12's for ledgers. The trestle can be any length desired. The brackets require no nailing or bolting, and are said to be self-positioning for the proper angle and pitch of the legs. Pointed lugs prevent slipping.

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The brackets can be used to build a scaffold of any height. The first section is usually made with 5-foot trestles. When the wall is 10 feet high, the first scaffold is set aside, and replaced with

10-foot-high trestles. When the wall is 15 feet high, 5-foot trestles are placed on top of the 10-foot scaffold. Repeating this process permits building scaffolds to any desired height.

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## Data on Vibrating Screens

A 4-page folder on its Style M Vibrex screens has been issued by Robins Conveyors Division of Hewitt-Robins, Inc., 270 Passaic Ave., Passaic, N. J. It points out how the two-bearing circle-throw principle is employed in this type of screen, and how the adjustable stroke

and angle adjustment simplify operation of the screen.

These screens are made in both floor-mounted and suspended models, and folder No. 122-A explains that their design permits them to be in balance at all times. It describes the welded construction, the screen cloth, and lists some of the applications for the Style M Vibrex screens. There is also a complete listing of models with both single or double decks.

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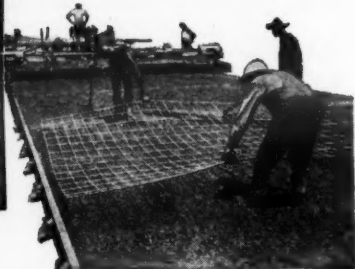
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# Taft-Hartley Act

(Continued from page 1)

affect commerce?" Looked at from that angle, the field is indeed a broad one.

The old Wagner Act, Mr. Denham said, was general and simple in its terms. It allowed the Board a great deal of discretion as to the character of cases it would hear or would not hear. It had only one kind of complaint cases—unfair labor practices by employers. So the Board could and did take the position that it would not go into the building and construction industry. It had the jurisdiction to do so, but it did not believe the purposes of the Wagner Act would be served by asserting it.

This avoidance was largely predicated on the theory that building is substantially local in nature, and that labor relations within the industry were fairly stable. As long as that theory existed, the employers were content to be left alone and the unions were satisfied. Because there were no other rights to be interfered with, no one objected to the Board's refusal to extend its operations into that field.

## The Taft-Hartley Act

When the Taft-Hartley Act became law, however, a wholly different situation was presented. No longer were labor organizations allowed the same freedom of action and the same immunity from restraint that they had enjoyed prior to August 22, 1947.

The law forbids the traditional closed-shop contract. It prohibits the secondary boycott, and makes it the subject of injunction proceedings which must be instituted without exception when a charge is filed and there is reason to believe that such a secondary boycott exists and that a complaint should issue. The strike to enforce a claim in a jurisdictional dispute is made the subject of very special consideration; the Board is charged with the responsibility for determining such disputes if the parties themselves are unable, within a period of 10 days, either to settle them or to agree upon a means whereby they will be settled. The refusal to handle struck work, or so-called "hot materials", is prohibited. The practice of requiring stand-by crews, which frequently arises out of jurisdictional disputes, is prohibited as part of the so-called "featherbedding provision". To impose excessive initiation fees upon new members is described as an unfair labor practice which can be charged to a labor organization. And it is an unfair labor practice for a union to cause the discharge of an employee who fails to maintain membership in good standing in the

union, unless there is a previously authorized union-shop contract. Even then the discharge is permitted only when the employee has failed to pay his dues or initiation fees.

Many of these prohibitions can apply in the construction industry. So the present Board would find it hard to avoid considering such matters. Nor is that all, Mr. Denham stated. For contractors, too, must conform to the requirements of the law, both as to unfair labor practices and matters concerning representation.

## Closed-Shop Problem

"As we approach the construction industry and the trade unions and contractors that are engaged in it," said Mr. Denham, "we find ourselves dealing with something which fits into none of the orthodox categories of industry or employment with which the Board is accustomed to dealing. The whole industry is unique in many ways, and the mere pattern of employment differs wholly from that to which we have been accustomed. Neither the employee nor the employer stands on stable ground so far as either identity of the employer or the location of the work is concerned. But, regardless of all that, we have a law to administer. It is a law with provisions that vitally affect this industry, and does not leave the employers and the employees wholly free to carry on their relationships in the traditional manner, with eyes completely closed to the existence and provisions of the Taft-Hartley Act."

The first problem which presents itself goes to the very heart of those relationships. The contractor, whether he be general contractor or specialty contractor, has habitually adhered to the closed-shop principle in his selection of workmen. But the law no longer permits the closed shop, except as it may be extended through the medium of presently existing valid contracts, which contain a closed-shop provision. If such a contract was made before June 23, 1947, the closed shop may not continue beyond the expiration date of such contract. Where the contract with a closed-shop provision was made between June 23 and August 22, the closed shop may not continue beyond the expiration date, or one year—whichever comes sooner. In the absence of such a contract, the employer no longer may commit himself to hire only union members in good standing.

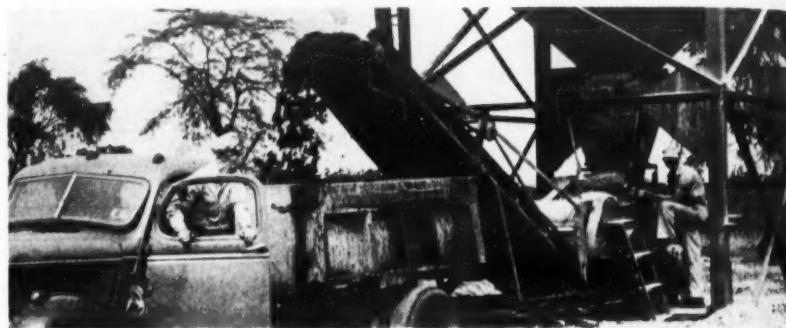
Under the union-shop provision which the Taft-Hartley law allows, the employer is not required to hire members of the union. He may hire any person he wishes—at the gate or wherever he finds him—provided that within 30 days of hiring, such person becomes a member of the union. And, when he

applies for union membership, the union may not deprive him of employment by turning him down. Nor may it impose penalties in the form of extra dues or initiation fees that are over and beyond dues and initiation fees charged applicants generally. For if it does so, he then has the right to continue in his job without membership in the union.

Under the old closed-shop contracts, Mr. Denham pointed out, contractors could not do this. They were required to hire only union men. And they had to discharge any man who fell into disrepute with the union, no matter for what cause, and who lost his good

standing. Under the present law, a man may not be discharged at the instance of the union merely because he has lost his good standing. It may only be where he has lost good standing because he failed to pay initiation fees and dues. Of course, the union may expel him from membership for any reason, but the employer may not discharge him at the instance of the union without incurring an obligation to reinstate him and to pay him back pay for the time lost. Or, in such cases, the Board may, within its discretion, require the union to make good the back pay so lost.

(Continued on next page)



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### Problems Not Simple

To effect this change from the traditional provisions to the ones that have the "New Look" will be a far from simple proceeding, said Mr. Denham. The law makes no allowances for inconveniences which it may impose. It legitimizes no union-shop contract or other form of union security dated after August 22, 1947, that has not been authorized by the secret ballots of a majority of the employees in a unit that is appropriate for that purpose. In other words, the union-shop provision in all post-August 22, 1947, contracts must be based upon the affirmative vote of a majority of all the employees in a unit represented by a specific union. And it must be in anticipation of contractual relations on their behalf by that union, with an identified or identifiable employer.

Over the course of a year, each contractor undoubtedly has half a dozen or more different crews working in their respective lines, on as many different jobs. The difficulty of obtaining a vote by all of these men is obvious, but the Act makes no allowance for that.

However, it should be understood that the question of the union-shop election applies only where the employees are and in the past have been represented by unions. A contractor who is accustomed to doing business in a given general area, and customarily has operated as a union shop, presents little or no problem on the question of which union or unions represents his employees. He knows which unions represent his workers and the various crafts engaged upon his operations. He has been in the habit of recognizing these unions as the representatives of his employees for purposes of collective bargaining over a period of many years.

"Therefore," Mr. Denham said, "we are not presented with the question of conducting elections to determine which labor organizations represent the various groups of employees. But, to conduct the required union-security elections, this is only one of a number of factors:

"1. We must have an identifiable employer—he may be a single employer, or a group of individual employers working in concert but each contracting for himself; or he may be a group of employers working through an association duly authorized to represent them in either a broad or limited sense for purposes of collective bargaining with

the employees. The whole thing is that we must be able to find an identifiable employer falling within those general descriptions.

"2. We must be able to put our fingers on the labor organization or organizations habitually recognized by this employer, or employer group, as the representative for collective-bargaining purposes of the employees working for the employer or employer groups in the various crafts.

"3. We must next determine the description of an appropriate unit of employees represented by each of such labor organizations in connection with their employment by the employer group, and

"4. We must determine which individuals, as of a given date, make up that appropriate unit.

"These are all essential, because the provisions of the law require that if there is to be any safe enjoyment of a union-security contract, it must be predicated upon an election held within a unit appropriate for that purpose, initiated by the petition of 30 per cent of the employees in the unit. In this election, a majority of the persons eligible to vote must vote affirmatively for the proposition to authorize their union to negotiate for a union-security provision in the contract under which they expect to work.

"This sounds very complicated, and I want to emphasize that in this industry, it is complicated. We cannot hold elections for a single employer, as we do in most other cases, because of the instability of the structure of his payroll. We cannot hold elections among all the people regardless of their craft operation, because each group or craft is represented by a different union; and we cannot hold an election on the basis of a general list of all the men who have been employed by a given employer over a given term, because those men may have worked for half a dozen other employers during the same term, or they may have worked only a day or two for one contractor and then drifted on into a different geographical area. We have struggled with the problem of how we are to do this thing which the law requires us to do, if the employees want it, and we have hit on this general formula which is to provide the general basis around which our election program in this industry must be formulated, making due allowances for the peculiar circumstances existing in each locality as we reach it."

### Plan of Procedure

Helped by representatives of the labor organizations and the employer organizations, the NLRB plans to conduct a survey of the entire country. From this survey, it plans to define as well as it can the various geographical areas in each of which there is to be found an identifiable employer group which will cover as nearly as possible all operators in the industry. These operators are to include the general-contractor group and the various specialty groups who handle, primarily, persons from a single craft, and who habitually deal with the union of that craft.

From each contractor, it hopes to obtain an analysis of his payrolls in each craft group, covering a period probably of a year. A uniform type of card will be provided, on which this material can be entered. When completed, this analysis will reflect, on card records, the work history of each person employed by a contractor during that period. There may be 8, 10, 20, or 100 contractors operating in the same type of business in each area. But no matter how many there may be, their payroll analyses, made up on uniform cards, will then be in shape to be consolidated.

(Concluded on next page)

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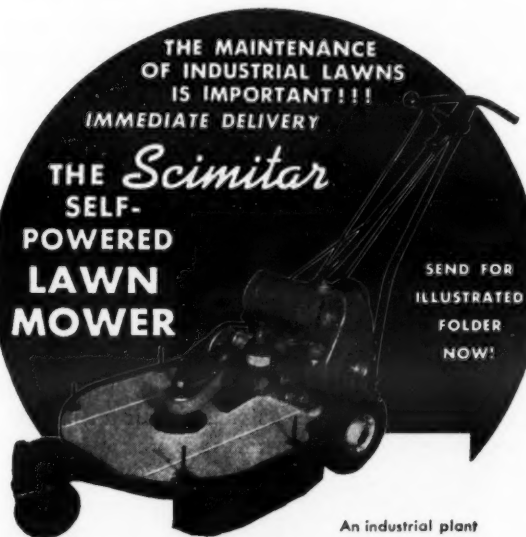
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## Taft-Hartley Act

(Continued from preceding page)

Those lists will provide the initial or gross composition of the appropriate units of craft groups in that area. But to eliminate the itinerant and the casual worker, all those whose work history indicates less than an agreed amount of employment during the year should be struck off the lists, said Mr. Denham. So should the names of those who have not continued as residents within the area, and who are not available for employment and to cast their ballots in the proposed election.

This is the initial process for one craft group in one area. Mr. Denham explained that it must be repeated for the employees represented by each of the participating unions in each area. When such analyses have been made as to all the crafts or all the employees represented by the participating union, the NLRB will then be prepared to hold an election in that particular geographic area. It is the hope, he said, that each area can be covered in a single multiple election, with polling places distributed in such manner as to make them available to all voters with a minimum of travel.

It is not known how many such areas will be found to exist, but Mr. Denham expects there will be at least one area for each council of the Building and Construction Trades Department. He also expects that there will be a substantial number of other areas in which there is no council but where the various unions have consistently done business with an organization, or group of organizations, of the employers. He anticipates some 700 areas in which these elections will have to be held, after concluding the payroll analyses outlined. With some 10 to 20 different unions doing business in each area, it is apparent what the construction industry involves in terms of elections to be conducted, under a process that has had to be specially devised to meet its particular needs.

Mr. Denham acknowledged that it might seem a hardship to be asked to make out these payroll transcripts. But he added that it is little more than has been asked of thousands of other employers throughout the nation during the past 12 years of the operations of the Wagner Act elections. "The bright spot", he said, "is that we do not anticipate it will be necessary to hold more than one such election unless there should be violent changes in the field of construction labor, because, as we see it, an authorization once given in this fashion is continuous as long as the unit continues to be appropriate, and the labor organization initially authorized remains the same. Once such an authorization has been made, it will continue to apply to all future contracts until the authorization is revoked or the representative ousted."

### Job Is Enormous

To carry out this program, the Board will have to recruit a very large number of temporary workers in each of the areas. A high degree of organization will be required if these elections are to be carried off with any degree of speed, and a statement obtained of the will of the 2,500,000 employees who will be affected thereby. Because this is so tremendous a job and, at the same time, so important a means of avoiding confusion in relations with employees, Mr. Denham asked for assistance and co-operation from contractors, and their patience with the NLRB in its efforts to do this thing.

He said the Board hoped to carry out two or three pilot elections in the very near future, patterned after this plan, as something in the nature of laboratory tests for the perfection of the tech-

niques. When they have been proved, they can then be applied to the national pattern. Those pilot elections are under study at the present moment and the machinery for them is already being set up. From those experiments, it is hoped to learn much that will be highly profitable in the larger picture, to avoid useless effort, lost motion, and waste.

"It has been said that this job cannot be done", Mr. Denham stated. "It can't be done without your active cooperation and assistance and that of the unions, but with that cooperation and assistance—we'll do it. As to whether such co-operation will be forthcoming, I have no doubt. We could not have come this far with our plans if we had not already had it—and I want now to thank the committees from the industry and the unions that have collaborated with us, and your own national office [AGC] that has spared no effort to assist. It is that kind of teamwork that will lick this and many of the other problems we will have to meet."

### Jurisdictional Disputes

Mr. Denham went on to point out that the Board is not made up of experts in the building and construction industry. Its members are not versed, from the standpoint of either employers or unions, in the intricacies of work allocation from which many jurisdictional disputes arise. Therefore, he said, the Board had a suggestion to make to the Associated General Contractors, to the national associations of specialty contractors, and to the officials of the labor organizations predominant in the field. It suggested that they work out among themselves some joint procedure to which both the labor organizations and the members of the various employer associations would be firmly committed, whereby a board of experts in this field could pass upon such jurisdictional disputes with accepted finality; and whereby, during the consideration of the dispute by such a board, there would be a commitment by all parties against work stoppages or shutdowns.

The establishment of a National Joint Board to settle such jurisdictional disputes in the building and construction industry was ratified by The Associated General Contractors of America during this meeting, and seven national organizations of specialty contractors ratified establishment of such a board February 10 in Washington, D. C.

A principal purpose of establishing this joint board is to avoid the necessity of bringing jurisdictional disputes before the NLRB. But it is expected that decisions of the national joint board will carry great weight with the NLRB in such jurisdictional cases as may come before it.

Such action, Mr. Denham told AGC members, is the most important contribution contractors can make to the economy of the nation at this time, and also one of the most important things that can be done for the welfare of the industry.

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